

Open innovation practices between universities and industry:

Enablers and barriers. Insights for practitioners

Tim Minshall

Dr John C Taylor Professor of Innovation
Head of Institute for Manufacturing

Overview

- Innovation
- Open innovation
- Role of universities in open innovation

Overview

- **Innovation**
- Open innovation
- Role of universities in open innovation

Innovation \neq Invention

Innovation \neq R&D

Innovation \neq 'theatre'



Innovation can be ..

Product **Radical** PRODUCTION PROCESS

Service *Incremental* **Business process**

Placement Paradigm Organisational

 Disruptive Sustaining **Platform**

Supply chain Ecosystem Social

People get excited by ..

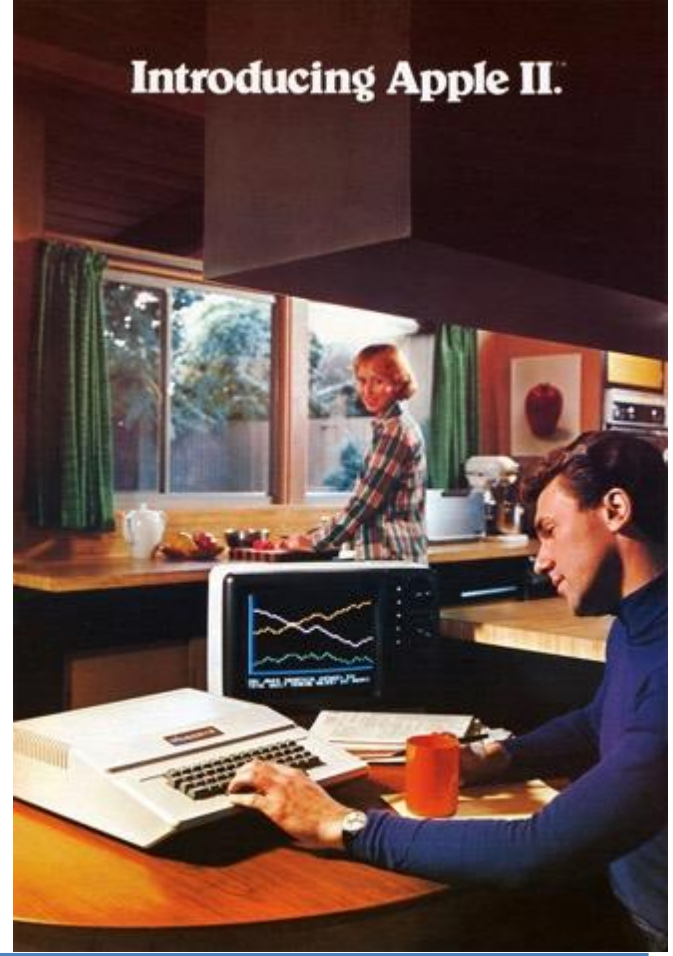
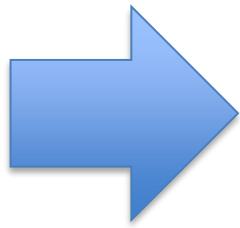
Product **Radical** PRODUCTION PROCESS
Service *Incremental*
Business process
Placement **Paradigm** Organisational
Disruptive Sustaining
Platform
Supply chain **Ecosystem**
Social



Image: www.currys.co.uk



COURTESY INAVIATION TOMMY BECKER





REDSTONE
INSIDE THE FAMILY FEUD

WHO TO BLAME FOR COLLEGE COSTS

\$60 OIL? BELIEVE IT

RETIREMENT GUIDE REMARRY OR SHACK UP? DYING WITHOUT A WILL

NOVEMBER 12, 2007 | WWW.FORBES.COM

Forbes

Nokia

ONE BILLION CUSTOMERS—CAN ANYONE CATCH THE CELL PHONE KING?

PLUS 11 GADGETS WE LOVE



<https://www.newsilike.in/nokia-mobiles-timeline-infographic/>

Incremental versus radical / disruptive innovation



Images: tesla.com; airbnb.com; uber.com; foxmovies.com



Billy Boyle
CEO of Owlstone Medical

What and how: Robust medical ID



Goatproof!

With thanks to Bang Ming Yong

Case: simprints every person counts

- Received a lot of support from partners

BILL & MELINDA
GATES foundation



 Grand Challenges Canada™
Grands Défis Canada™



ARM



CAMBRIDGE UNIVERSITY



entrepreneurs



VISION TO SUCCEED



redgate



With thanks to Bang Ming Yong



Image: State Library of South Australia



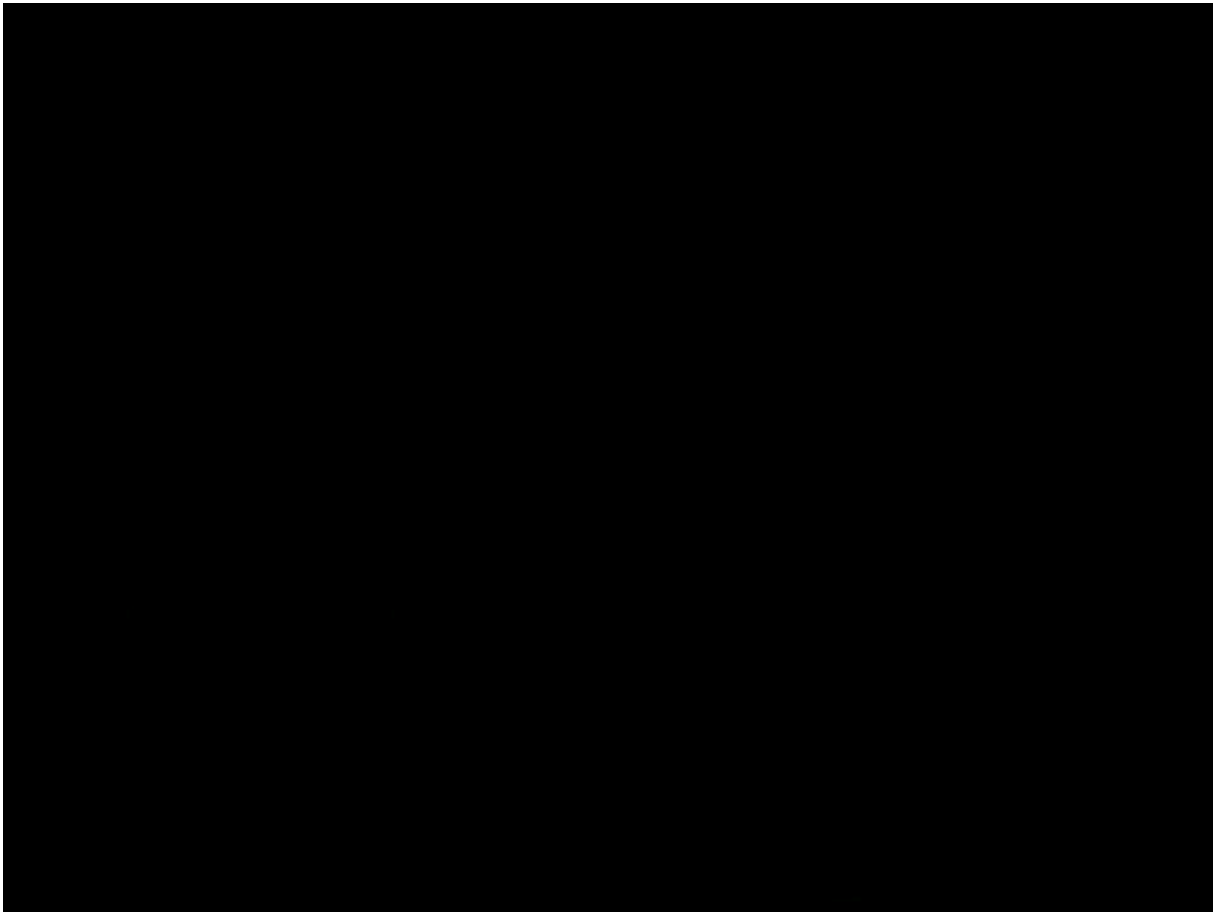


Simple concept: complex system solution



Image: www.portofelixstowe.co.uk

Failure



Failure Risk No

Overview

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You can't do everything on your own

Open

You may miss something important if you focus internally

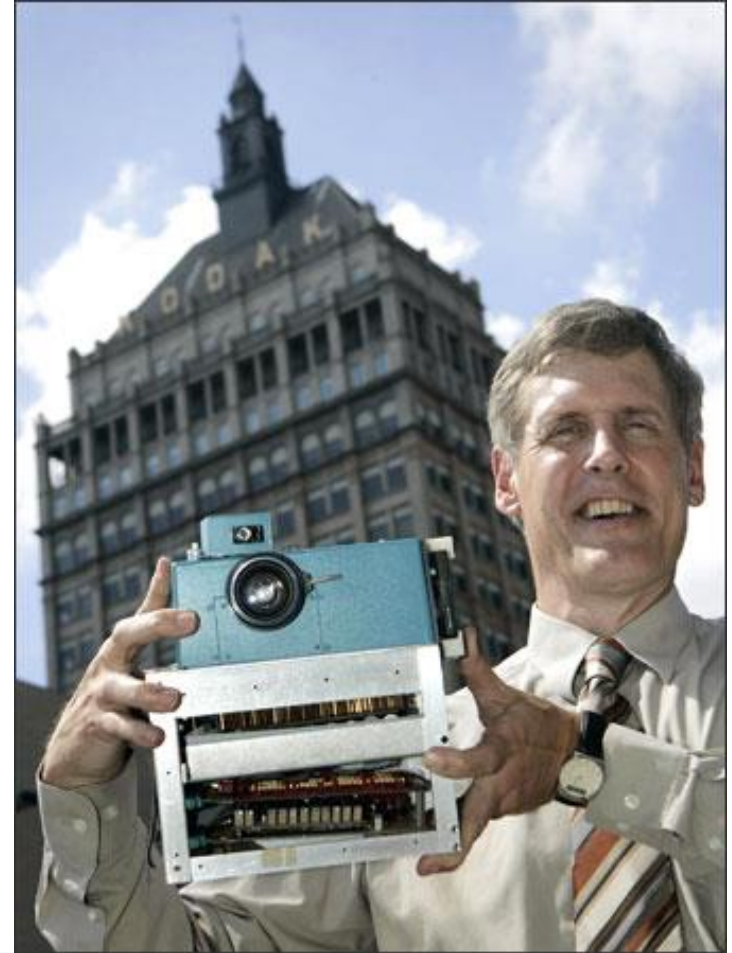


Images: web.eecs.umich.edu/~profmars; heobjectreport.blogspot.co.uk/2016/03/androids-supercomputers-and-bell-labs.html

Kodak: An example of being too inward looking?

Digital camera technology came from within the company but speed of impact was underestimated

Associated Press via
<http://www.seattlepi.com/business/article/Kodak-engineer-had-revolutionary-idea-the-first-1182624.php>



PHYSICAL PRODUCTS IN PHYSICAL SPACE

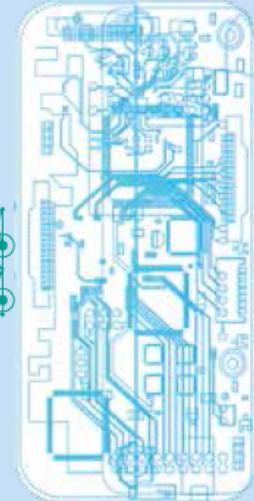
DIGITAL PRODUCTS IN VIRTUAL SPACE



E.G. SENSORS & BIG DATA



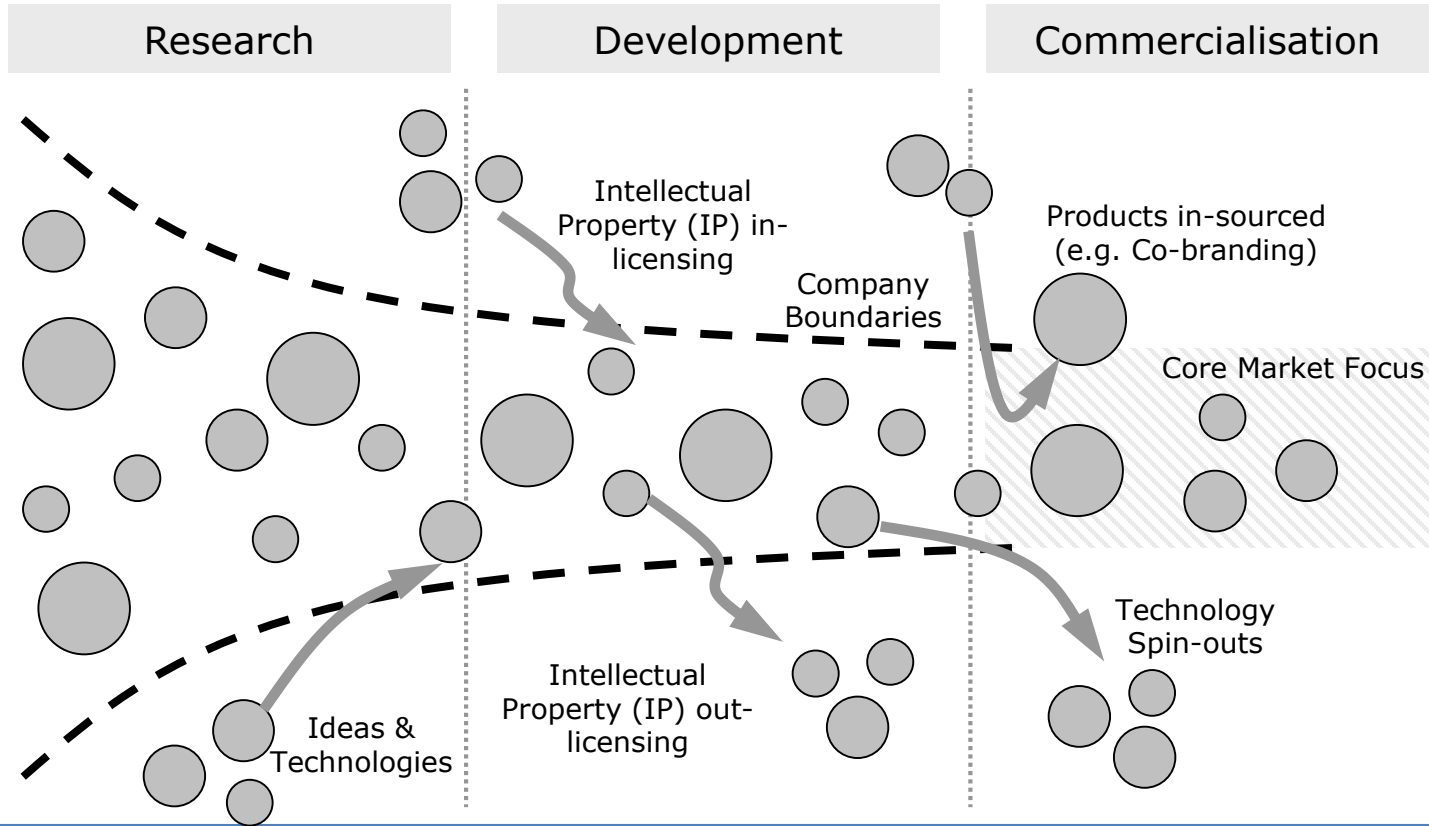
E.G. ADDITIVE MANUFACTURE & AUGMENTED REALITY



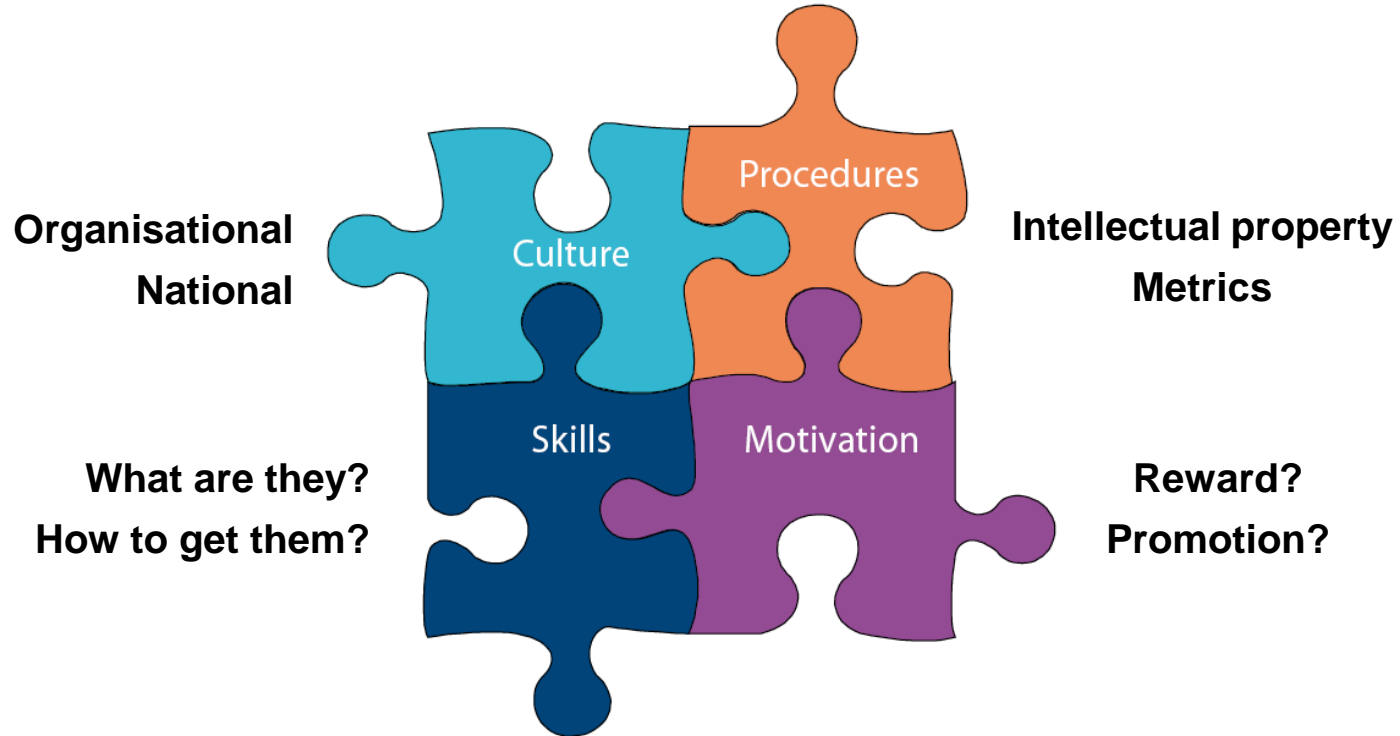
<http://industrialdigitalisation.org.uk/>

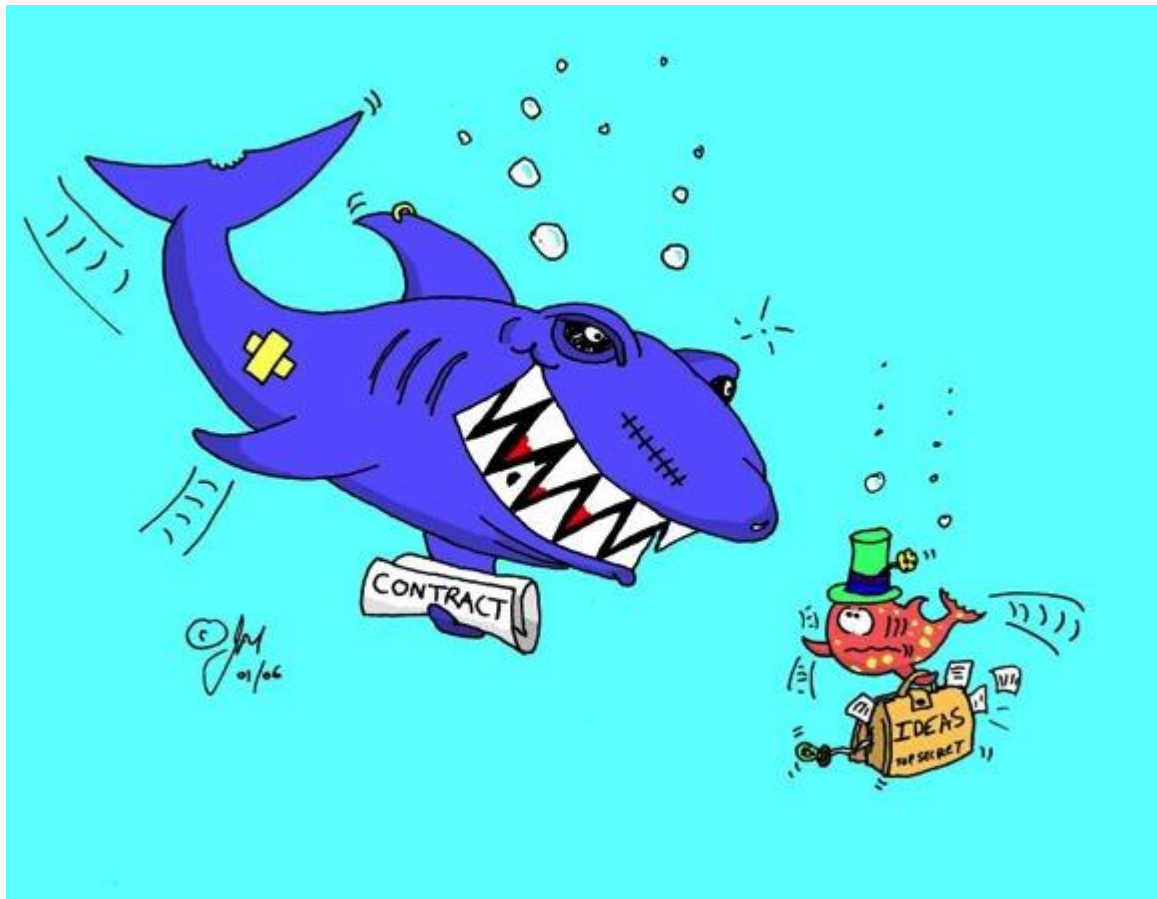


'Open' new product / service development process



Management challenges of open innovation



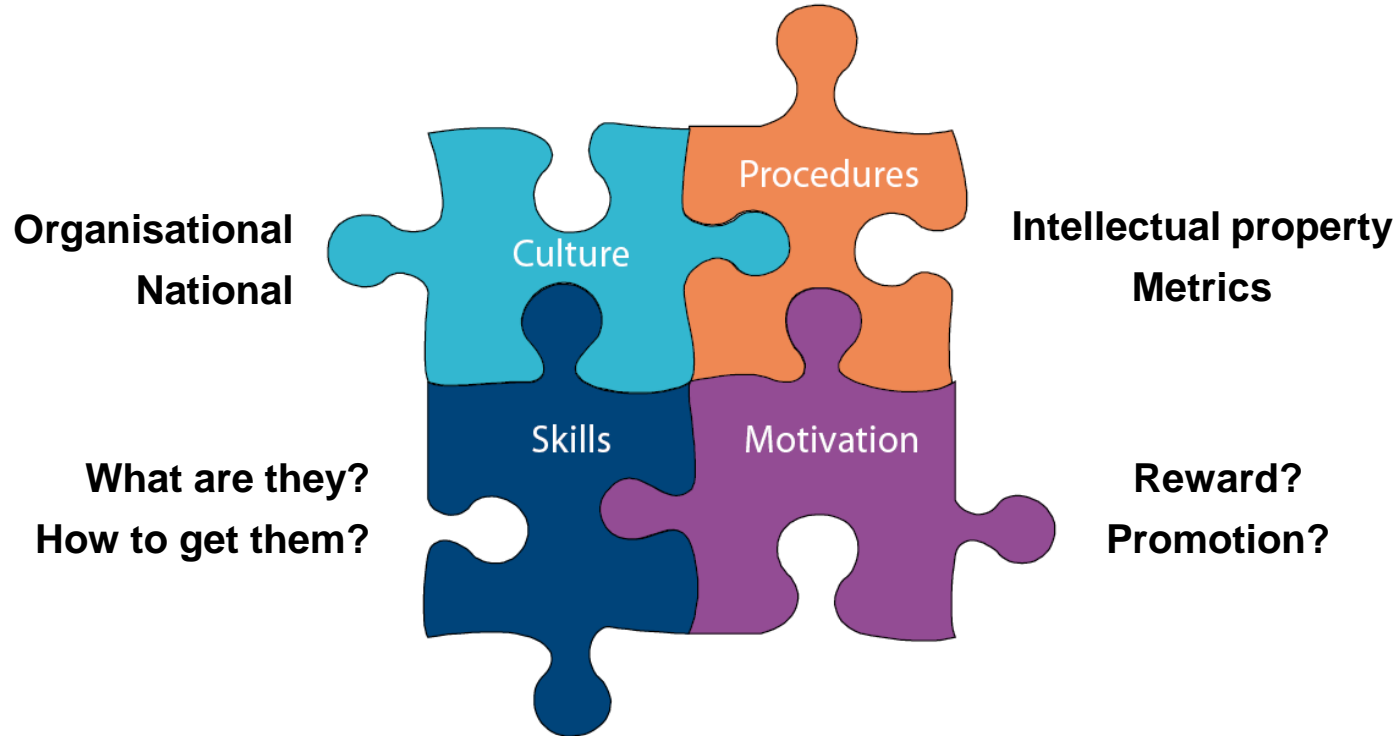




Images: wikipedia and Kondicherry - Own work, CC BY-SA 3.0

Failure Risk No

Management challenges of open innovation



Skills for open innovation

1. Introspective

Know your own business

2. Extrospective

Know you partner's business

3. Technical

Financial, portfolio management

4. Interactive

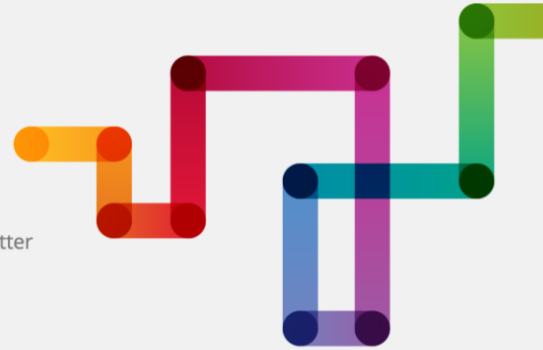
Communication, negotiation

Mortara, L., J. J. Napp, I. Slacik and T. H. W. Minshall (2009). How to implement open innovation: Lessons from studying large multinational companies, University of Cambridge Institute for Manufacturing ISBN: 978-1-902546-75-9.

Challenge driven innovation for good

Never have we faced so many challenges and never have we been better equipped to resolve them.

Show your prize to the world



<http://challengeprizecentre.org/>

One solution: become more open



PHILIPS

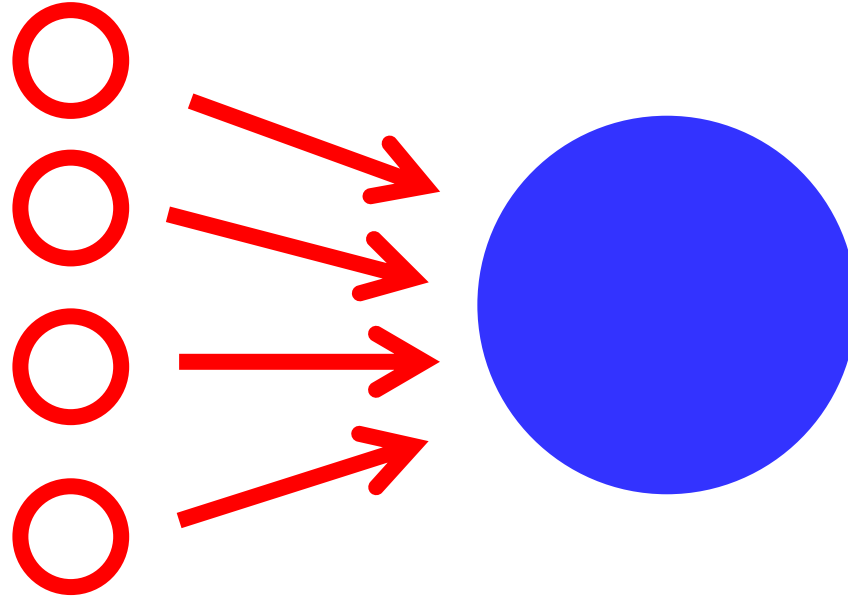


**HIGH TECH CAMPUS
EINDHOVEN**

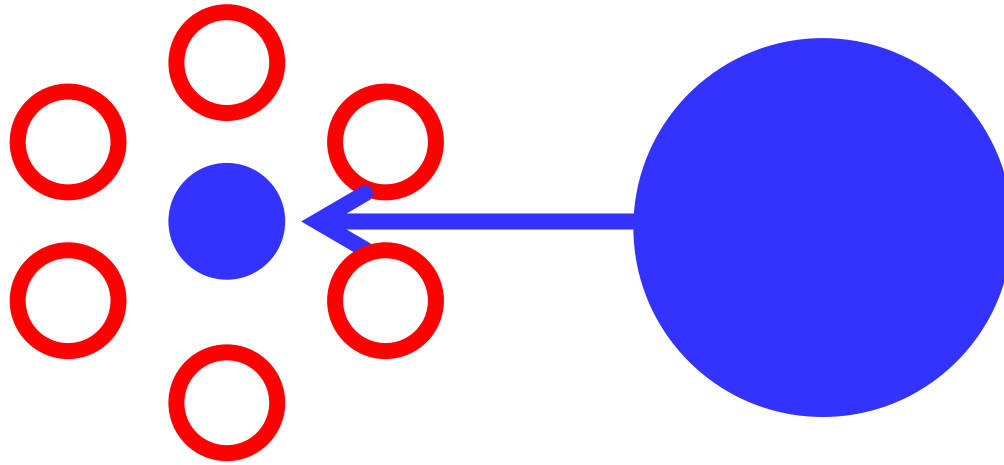


<https://colworthpark.com/> <http://www.hightechcampus.com/>

'Come to me' strategies



'Go to them' strategies





'Innovation Ecosystem'?

CAMBRIDGE UNIVERSITY
entrepreneurs
 SYSTEM TO SUCCEED

CUGEE
 Cambridge University
 Technology and Enterprise Club

Unilever

CaT
 Cambridge Antibody Technology

OWLSTONE

GLOBAL INKJET SYSTEMS

C|D|T

astex

bp

DOMINO

enecsys

Microsoft

PA Consulting Group

ARM

TTP GROUP

Autonomy

cambridge enterprise
 commercialising University science

i-Teams

UNIVERSITY OF CAMBRIDGE
 Careers Service

IfM Centre for Technology Manager

Want to learn more?

CIPHER

NOKIA
 Connecting People

zeus
 TECHNOLOGY

CSF

QUALCOMM

PLASTIC LOGIC

LIGHT BLUE OPTICS

Rolls-Royce

SAGENTIA

PHILIPS

abcam

Cambridge Consultants

Cambridge NETWORK

in Europe

Overview

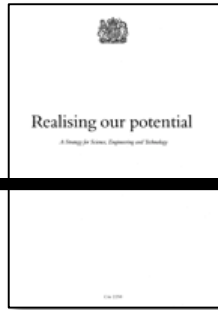
- Innovation
- Open innovation
- **Role of universities in open innovation**

Changing role of universities

IMPACT

Two parallel phenomena

1960s 1995 2000 2005 2010 2015



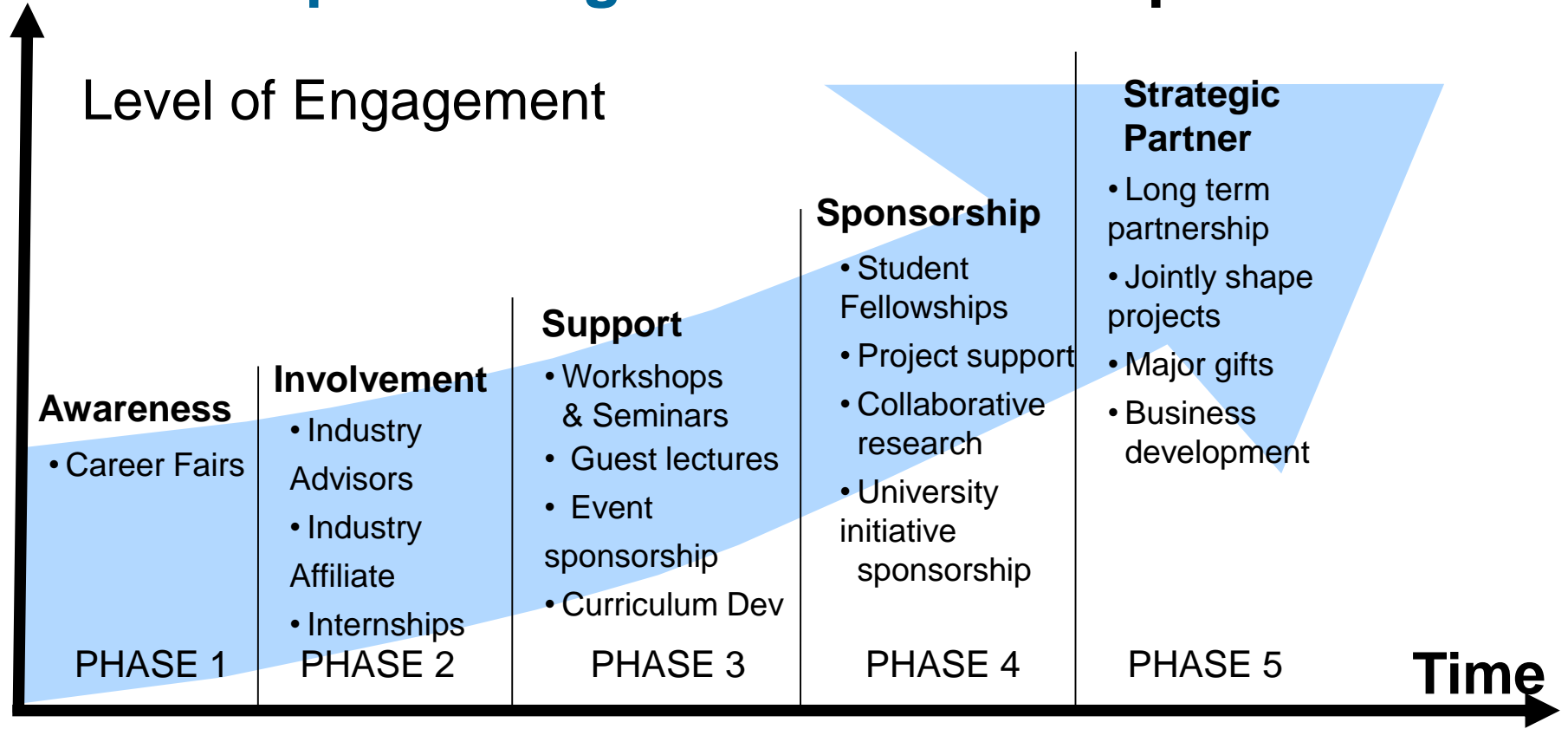
**Emergent phenomenon;
Effectual implementation logic**

2003



**Planned change;
Causal implementation logic**

Partnership Building: The “Partnership Continuum”



Source: Wayne C Johnson, VP, HP University Relations Worldwide / With thanks to Dr Eoin O’ Sullivan, University of Cambridge Centre for Science, Technology and Innovation Policy



'Innovation Ecosystem'?

CAMBRIDGE UNIVERSITY *antiparaphors*
 CUGEE Cambridge University Technology and Enterprise Club
 Unilever
 CaT Cambridge Antibody Technology
 OWLSTONE
 GLOBAL INKJET SYSTEMS
 C|D|T
 Cambridge Enterprise commercialising University science
 i-Teams
 UNIVERSITY OF CAMBRIDGE Careers Service
 IfM Centre for Technology Manager
 NCI
 Astex
 bp
 DOMINO
 Enecsys
 Microsoft
 PA Consulting Group
 ARM
 Plastic Logic
 LIGHT BLUE OPTICS
 Rolls-Royce
 PHILIPS
 Abcam
 TTP GROUP
 Autonomy
 Cambridge Consultants
 Cambridge NETWORK
 in Europe

		Phase of support for innovation/engagement		
		Experiment	Consolidate	Institutionalize
Phase of OI implementation	Unfreeze			
	Move			
	Institutionalize			

Minshall, T., L. Mortara and T. Ulrichsen (2016). "University-industry partnerships and open innovation implementation: Key developments and experiences from the University of Cambridge." *University of Cambridge Centre for Technology Management Working Paper Series February 2016*(1).

		Phase of support for innovation/engagement		
		Experiment	Consolidate	Institutionalize
Phase of OI implementation	Unfreeze	A1, C1-C2, (D1)	D2	
	Move		A2, C3	E1-E2, F1
	Institutionalize		B1	A3, C4

Partnership Building

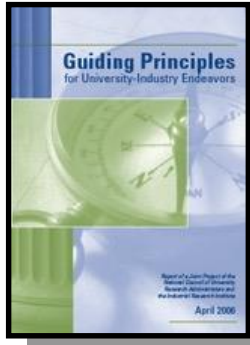
Balancing Industry & Academic Culture

Industry Culture	University Culture
Proprietary knowledge as asset	Open publication / knowledge exchange
Employees	Students, post docs, and junior faculty
Project management	“Organized anarchy”
Risk management	Cutting-edge / novel research
Applied research / Short term focus	Basic research / Longer term focus
Company-specific skills development	Education
Focus on “bottom line” profits (£)	Focus on generation of new knowledge

With thanks to Dr Eoin O’ Sullivan, University of Cambridge Centre for Science, Technology and Innovation Policy

Partnership Building

Balancing Act – not just “culture”



[Source: Via Dr Eoin O'Sullivan, University of Cambridge Centre for Science, technology and Innovation Policy; ; from US Government-University-Industry Research Roundtable: www.nationalacademies.org/guirr/Guiding_Principles.pdf]

Guiding Principles for University-Industry Endeavors 6

April 2006

- ◆ Contribution in Support of Missions – The Larger University-Industry Relationship
Though the missions of universities and industry partners are fundamentally distinct and occasionally opposed, the most successful collaborations contribute to the missions of each party. The parties help reach this point by acknowledging each other's mission, as well as the objectives and constraints each faces.
Below are some specific examples of how each partner may contribute to the mission of the other, as well as the objectives of each party:
- ◆ University Contribution to the Industry Mission:
 - Training of future and current industry workforce (students) through undergraduate and advanced degrees (retention of trained work force)
 - Contribution to the general
 - Advancing the state of the
 - Acting as a filter to distill, i that knowledge particular transfer)
 - Performance of specific re
 - Licensing inventions and d purposes, including reven
 - Providing access to univer specialized resources
 - Fostering economic devel
 - Objectively testing, evalua
- ◆ Industry Contribution to the U
 - Employing students and gr
 - Donating (equipment and r scholarships, research, or
 - Providing either materials sabbaticals
 - Employee time and knowle as assisting student projec service on advisory board
 - Enabling access to industr specialized resources
 - Providing leading-edge re
 - Providing financial and/or interest to the industry par
 - Paying technology licensir and educational programs
 - Contributing to general kn
 - Bringing university contrib (technology transfer)

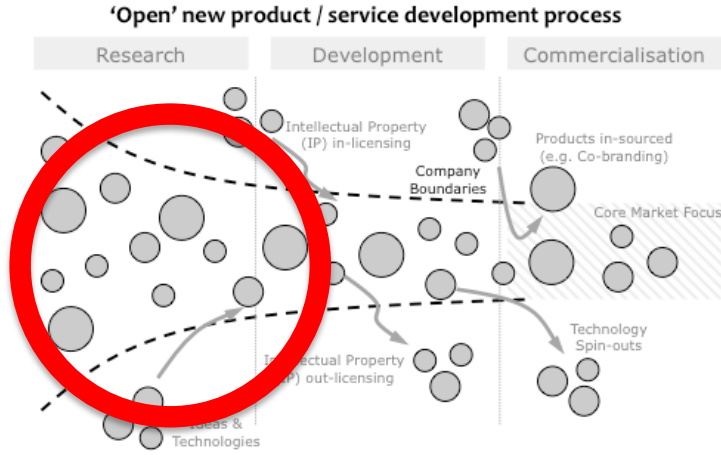
Guiding Principles for University-Industry Endeavors 7

April 2006

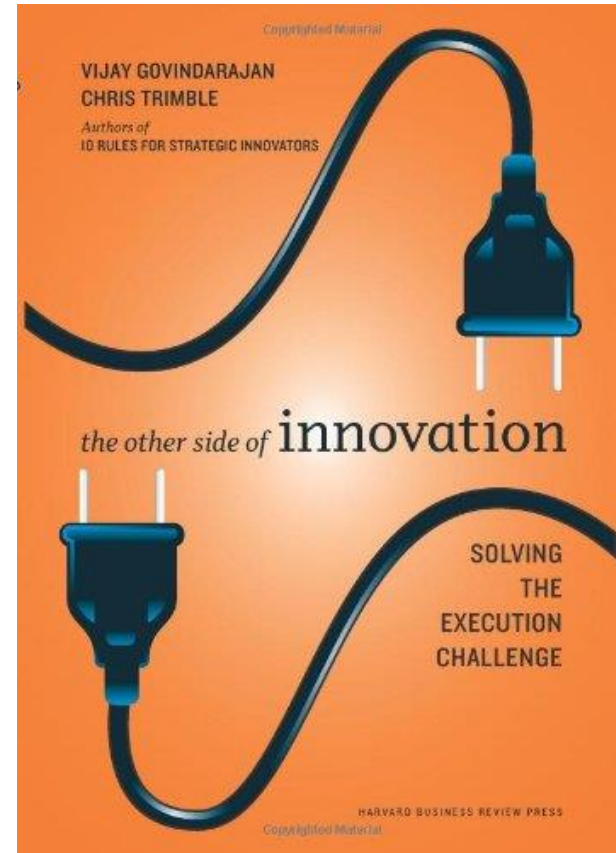
- ◆ University Objectives:
 - To benefit the public by adding to and sharing knowledge broadly
 - Educate and support an educated and well-trained workforce
 - Transfer technology and knowledge to enhance commercialization
 - Foster economic development at state and national levels
 - ◆ Industry Objectives:
 - Create and deliver new and improved products and services to enhance profitability
 - Locate advancements made by others that solve/answer general and specific problems faced by the industry partner
- and competitive workforce objectives, both parties must industry in a collaboration. Some
- rules and regulations, e.g. used regulations on the use
- terest and commitments
- r time
- sint
- i research and university
- distinction not always
- rch must be recognized and
- business plan and budget rely manner to commercialize with
- lar goals, milestones, and

Competing:

- Objectives
- Contributions
- Constraints
- Metrics



Doherty, M. (2006), Primer on 'Open Innovation': Principles and Practice, *pdfsa (Product Development and Management Association) Voice* (April 2006), pp 13-17.
 Chesbrough, H. (2003), *Open Innovation: The New Imperative for Creating and Profiting From Technology*, Boston: Harvard Business School Press.



Execution Momentum Ambidexterity

**“A Safe Place to Do
Risky Things”
Dr Andy Richards**



RAEng Visiting Professors of Innovation

- **Pieter Knook** was formerly Director of Internet Services at Vodafone and President of Microsoft Asia.
- **Sam Beale** was Head of Technology Strategy at Rolls-Royce Group.
- **Rick Mitchell** was Group Technical and Quality Director at Domino Printing Sciences.



Microsoft®





SUNDAY, FEBRUARY 12, 2012

Start with open questions: How Cambridge academics are learning the skills of open innovation

Many large corporations talk of transforming themselves to embrace open innovation, and opening up to external ideas. But grand strategic statements and new corporate PowerPoint slides do not change the capabilities of an organisation. The implementation of a more open approach rests also on the development of specific skills among individual employees. Research has identified [what some of these skills are](#), and shown that these can be internally developed or [accessed via various intermediary organisations](#). Much of this research on open



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Further information

- www.ifm.eng.cam.ac.uk/csti
- <http://www.ifm.eng.cam.ac.uk/research/ctm/openinnovation>
- Chesbrough, H. (2003). "The era of open innovation." Sloan Management Review Spring 2003: 35-41.
- Chesbrough, H. (2003). Open Innovation: The New Imperative for Creating and Profiting from Technology. Boston, Harvard Business School Press.



A workshop was held in Cambridge UK in April 2004 to identify ways of strengthening the ability of universities and industry partners to develop mutually beneficial and effective strategic partnerships. This is becoming a critical area for universities and companies alike. The report draws upon the collective and comparative experience of senior thought leaders and practitioners from leading UK and US universities, large research-intensive multinational companies and UK & US government agencies. Expert panel recommendations and smaller published research group sessions focused on key features of different stages of the partnership journey with the goal of identifying key lessons and effective practices.

This document presents the key lessons and effective practices identified by the workshop with the following themes:

- Exploring the value proposition and potential benefits
- Initiating strategic partnerships
- Nurturing and managing them
- Building resilience to deal with disruption and change
- Access for government R&D funding agencies
- Key challenges and opportunities moving forward

The workshop focused on three higher value partnership models:

- Aim for the longer term
- Transcend any one project and individual
- Invest investments by all sides in developing shared and cross-strategic relationships
- Involve commitments and buy-in by senior strategy leaders in the partner organisations
- Embed some degree of selectivity on the part of the company and the university
- Through strategic commitment, aim to achieve greater returns on partner investments

THE RISE OF STRATEGIC UNIVERSITY-INDUSTRY PARTNERSHIPS

Strategic partnerships are becoming an increasingly important part of the strategy of leading universities. Evidence of the rise and significance of such partnerships over the past decade emerged through the workshop.

Many large research-intensive companies, in particular, have been consolidating their investments in universities, to focus on developing a core set of strategic, long-term partnerships with a selective group of universities. Despite their continuing scientific leadership, the UK and US are facing intensifying global competition for these types of investments, with growing opportunities for research-intensive partnerships in emerging markets such as China, India and Brazil.

In response to these key trends, universities in the UK and US have been experimenting in their approaches to developing and nurturing effective strategic partnerships, and learning from these experiences.

It is therefore critical to reflect on, and learn from, the collective experiences to ensure the necessary capabilities, processes and resources are in place to remain competitive for these types of larger scale and higher value investments in the future.

JUNE 2004

