Challenges in Commercialising Public Sector Research

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jcstrategy

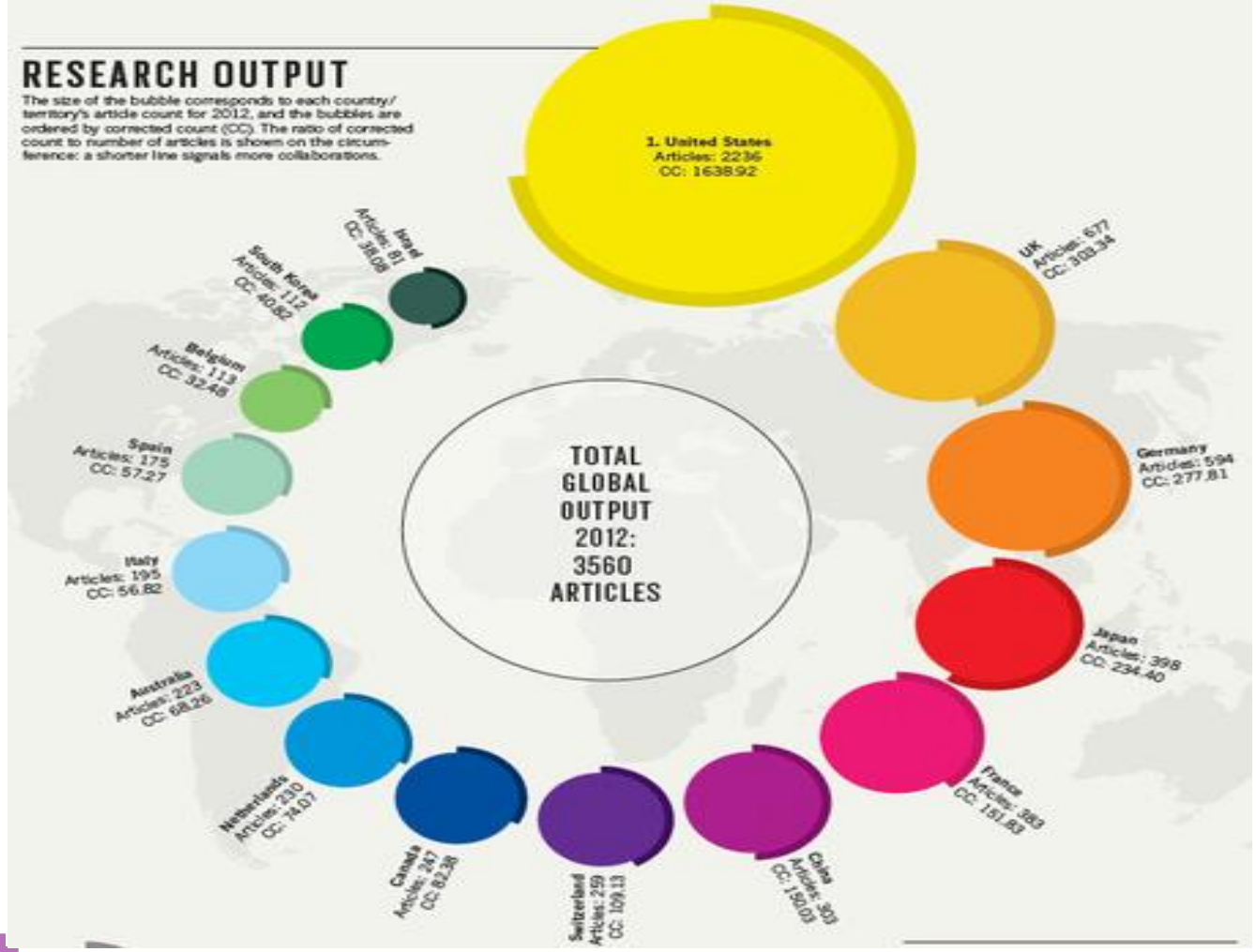
Overview

- Some Drivers of Change Influencing Public R&D and Firms
- Publicly Funded Research and Technology Transfer
- Stimulants, Barriers and Challenges of Commercialsing Public Sector Research
- Creating Conditions for Exploiting Public R&D Commericalisation
- Exploitation of Public R&D: Strategy and Innovation

Some Drivers of Change

‘Progress is impossible without change, and those who cannot change their minds cannot change anything’

George Bernard Shaw



Pressure on Scientific Production & Growing Productivity Expectations

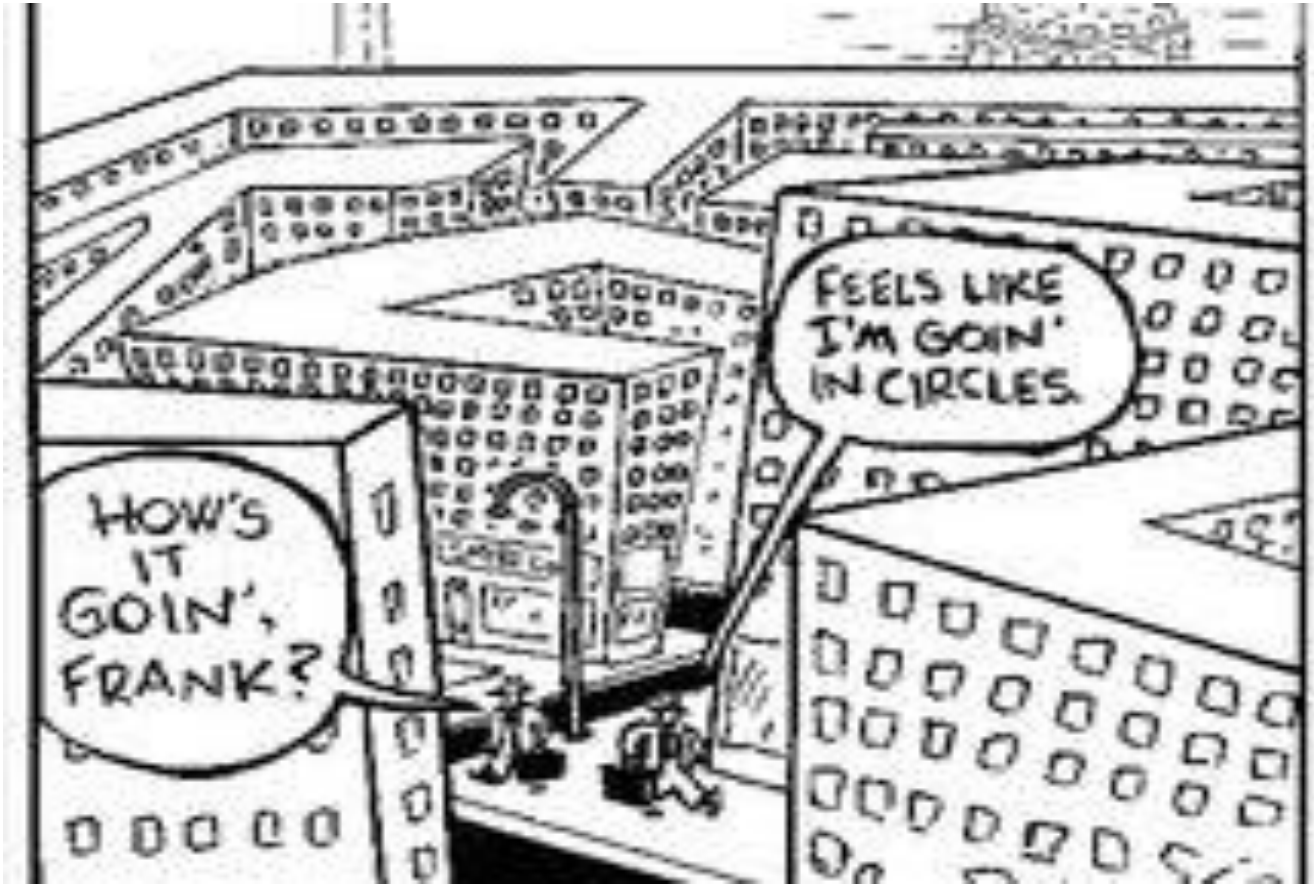
- The value of scientific production to economy and society in an age of austerity with low or no growth economic conditions

Multidisciplinary Focus

- Addressing complex problems that requires multidisciplinary expertise and research teams with complimentary skills

More Rapid Advancement of Scientific Discovery

- Provide for convergent and technology market opportunities
- Disruptive technologies and new convergent market opportunities
- Creation of new business models



+ Funding

- Less public investment and expectation that private sector will fund more basic and applied research
- Public R&D investment aligned to national/ European priority areas to support industry and national innovation systems

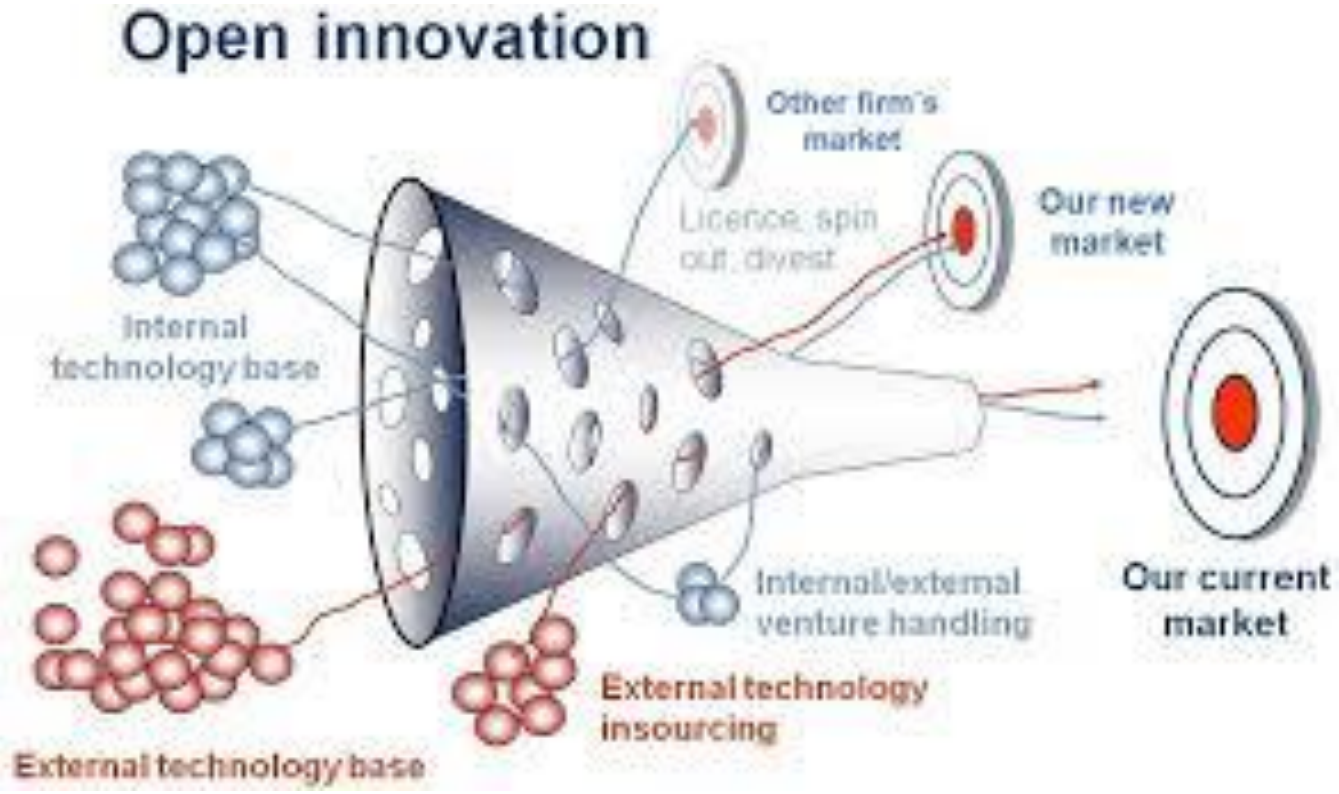
Access to Publicly Funded Research

- Open repositories versus international publishers

Exploitation and Management of Technology & Innovation

Significant changes in the manner in which *organisations and management manage fo technology and knorwledge transfer exploration and exploitation purposes*

Circular economy; Google



Open and Collaborative Innovation & IP Exploitation and Open Science

Strategic Partnering

Leveraging of Public R&D Funding

Higher Expectations of Exploitation of Technology and Knowledge from HEIs and PROs to Private Sector

Wealth Creation
Employment
Competitiveness

2014
THE AWARDS
AWARD WINNER
ENTREPRENEURIAL UNIVERSITY OF THE YEAR

Entrepreneurial Universities & PROs

- An entrepreneurial university is a natural incubator that tries to provide a supportive environment in which the university community can explore, evaluate and exploit ideas that could be transformed into social and economic entrepreneurial initiatives.
- Entrepreneurial universities are involved in partnerships, networks and other relationships to generate an umbrella for interaction, collaboration and co-operation
- Universities and PROs directly contributing to economic growth

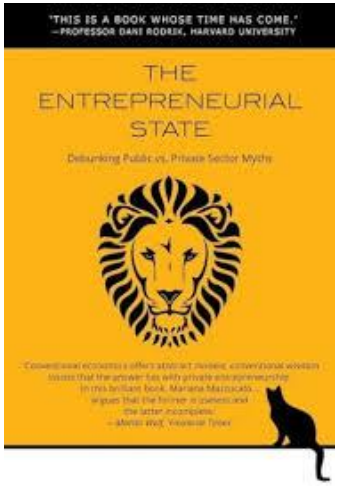
Guerrero, Cunningham, Urbano (2015) Economic impact of entrepreneurial universities' activities: An exploratory study of the United Kingdom, *Research Policy*

Publicly Funded Research and Technology Transfer

Strategic Importance of Public R&D

The question is not whether increased university-industry collaboration can yield desirable outcomes for all concerned: clearly, it can and often does, the question is how?

J. David Roessner (1996) the Georgia Institute of Technology



Characteristics of Public R&D

	Public research characteristics
Autonomy	Traditionally, public research is identified as the "freest form of support" (Chubin and Hackett 1990)
Ownership	Publicly funded research is owned and financed by government. Scientific knowledge produced from public research is identified as a public good (Callon 1995; Stephan 2004)
Type of research	Includes significant levels of applied research and most basic research which tends to be excluded from R&D activities administered under market conditions (Drejer and Jorgensen 2004)
Public funding allocation models	Varies across national innovation systems and dependent on national priorities (Mangematin 2004). Alternative and evolving funding allocation systems including allocation through public competition and incentive structure allocation systems (e.g. key performance indicators such as bibliometric performance) (Link and Scott 2012)
Governance	Public pressure for ensuring informed spending of public money (Lyall et al. 2004). Consequently, public funding increases the levels of accountability and transparency required (Chubin and Hackett 1990)
Location	Typically located at universities and public research laboratories with resultant influences of organisational strategies, processes, systems and cultures
Performance evaluation	Influenced by research organisation and includes scientific output and impact, economic impact, scientific and technical human capital impact, and political impact (Bozeman 2000). Social benefits (Rubenstein et al. 2003)

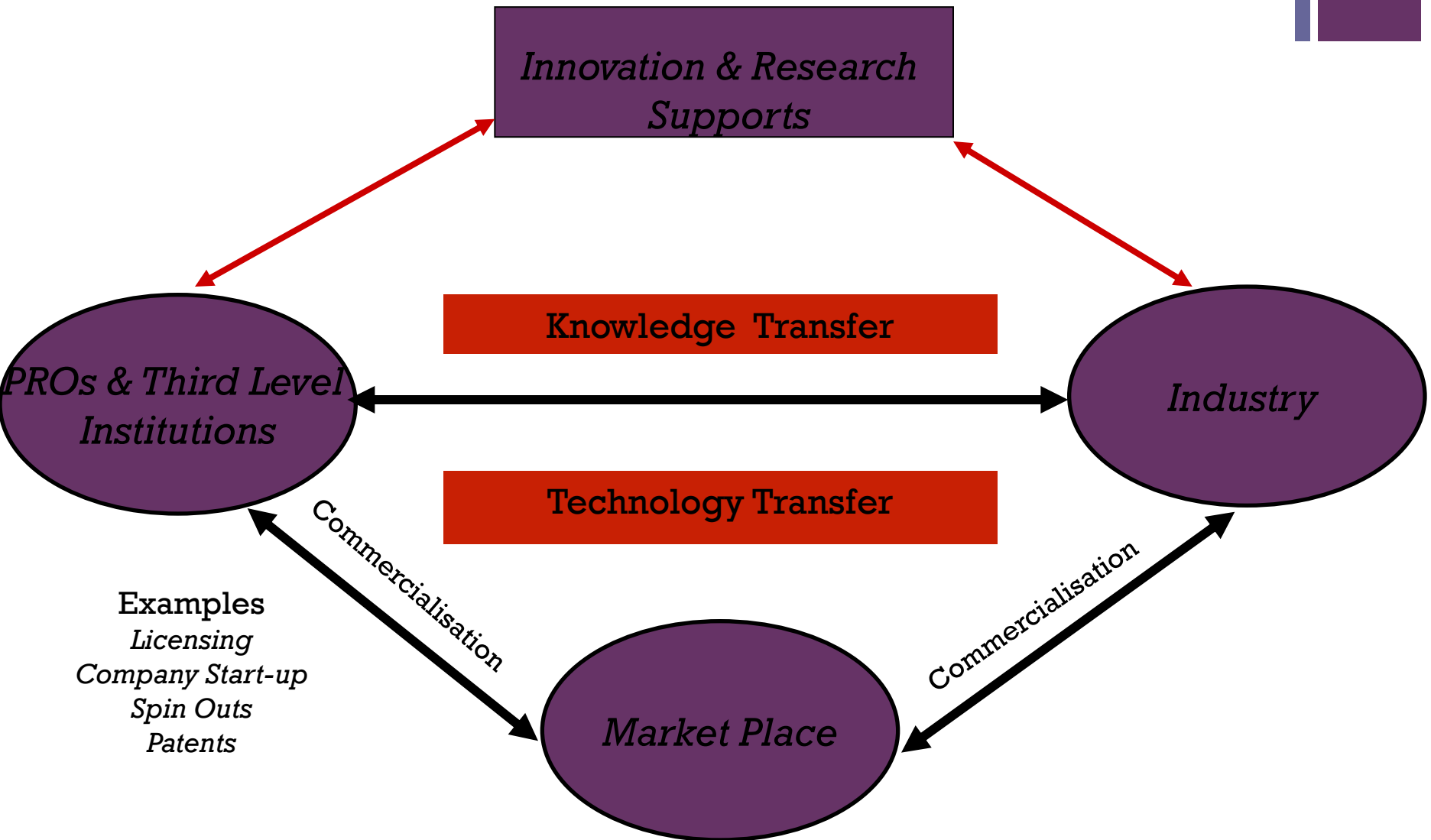
See Cunningham, O'Reilly, O'Kane and Mangematin (2014) The inhibiting factors that principal investigators experience in leading publicly funded research, *Journal of Technology Transfer*, 39(1),93-110.

Benefits of Public R&D

Public	Incremental GDP benefits from patent licensing and new spin-offs (Vincett 2010). Supply of skilled graduates (Mangematin and Robin 2003). Increased capacity for scientific and technological problem solving (Puay Tang and Martin 2007) Supports the adoption of socially desirable research which otherwise may not receive private funding (Rubenstein et al. 2003)
Research institution	Development of new knowledge, methodologies and scientific instruments (Joly and Mangematin 1996) Strengthening of relationships with research stakeholders, including industry (Bozeman and Gaughan 2007) Diversification of institutional funding (Geuna and Nesta 2006) or equipment (Nedeva et al. 1999)
Individual scientist	Expansion of networks for knowledge production and social interaction (Callon 1995). Increased personal income through royalty payments from patents or spin-outs (Göktepe-Hultenet and Mahagaonkar 2010)

See Cunningham, O'Reilly, O'Kane and Mangematin (2014) The inhibiting factors that principal investigators experience in leading publicly funded research, *Journal of Technology Transfer*, 39(1),93-110.

Public R&D & Supporting Institutions



PROs & HEI Industry Knowledge & Technology Transfer

Mode 1: Non Commercial Transfer

Seminars/Field Workshops

Research Symposiums and Colloquiums

Publications and Conferences

Informal Contacts

PRO/ HEI

Industry

Mode II: Commercial Transfer

Collaborative Research

Contractual Research

Consulting and Technical Services

Licensing and Sales of Intellectual Property

Mode III: New Company Generation

HEI/PRO Spin-out firms or Spins in (Industry to HEI/PRO)

Stimulants, Barriers and Challenges of Commercialsing Public Sector Research

Some Stimulating Factors: Macro and Micro

- Level of Business Investment in the Region
- Proximity to Industrial Clusters
- Support of Development Agencies and Research Councils
- Government Support & Investment
- Research Excellence
- Quality of TTOs
- Scope of Commercialisation
- Inventor Involvement
- Documented Policies
- Realistic Expectations

Sources Adapted from James Cunningham and Brian Harney (2006) *Strategic Management of Technology Transfer*, Oak Tree Press 109-143 and Natasha Evers, James Cunningham and Thomas Hoholm (2014) *Technology Entrepreneurship*, Palgrave McMillan, p.46

Some Barriers to Research Commercialisation

- TTO Organisational Structure
- IP Ownership
- Perceived Conflicts of Interest
- Overvaluation of IP
- Trust
- Complicated TT Policies and Process
- Lack of Support of SME Tech Transfer

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Barriers: Scientist/Principal Investigator Perspective

Political & Environmental	Institutional Inhibitors	Project Inhibitors
• Tensions between TT and Scientific Production • Competing Stakeholder Interests • Support Reliability of Public Funders	• Technology Transfer Supports • Human Capital	• Power of Industry Partners

See Cunningham, O'Reilly, O'Kane and Mangematin (2014) The inhibiting factors that principal investigators experience in leading publicly funded research, *Journal of Technology Transfer*, 39(1),93-110.

Cultural Barriers: Mutual Incomprehension

Cultural Differences HEIs/PRO vs Industry	
HEIs/PROs Values	**Industry Values**
New Invention	New Application
Advancement of Knowledge	Added Value
New Means for further research	Financial Returns
Basic Research	Applied
Long Term	Short Term
To Know how? What? Why?	Product/Service Driven
Free Public Good	Secrecy
Publication	Protection/Patents
Academic Freedom	Commercial Approach
Supply Side Model of Action	Demand Side Model of Action

Sources Adapted from James Cunningham and Brian Harney (2006) *Strategic Management of* Technology Transfer, Oak Tree Press

Creating Conditions for Exploiting Public R&D Commericalisation

Some Empirical Insights

- HEI/PRO are more likely to collaborate with industry if:
  - The business is engaged in exploratory internal R&D (Bercovitz and Feldman, 2007)
  - The business is mature and large (Stuart et al. 2007; Fontana et al. 2006)
  - Lack of IP issues between parties (Hall, 2004; Hall 2001)
  - Faculty part of university research centre (Boardman and Corley, 2008 and Link et al, 2007)
  - Access is positive and statistically significant in relation to fostering university-business R&D (Cunningham and Link, 2015)

Scientists in the PI role are critical boundary spanning actors that can are scientific and market shapers (Cunningham et al, 2015; Mangematin et al, 2015; O'Kane et al,2015).

Firm Benefits of R&D Collaboration with Universities/PROs

- Productivity of business R&D increases with university participation in R&D processes (Link and Rees, 1990)
- Probability of an R&D project beginning commercialisation increases when a university is an R&D partner (Link and Ruhm, 2009)
- Business's economies of technological scope increase with university involvement (Leyden and Link, 2013, 2014)
- Access to research and discoveries (Lee, 2000)
- Leveraging research investments (Graff et al, 2002)
- Sharing R&D expenditure (Sheehan and Wyckoff, 2003)

Exploitation of Public R&D

Strategy and Innovation

For firms seeking to exploit and leverage public R&D effectively it is a question of firm strategy and innovation

Firm Strategic Challenges & Innovation Dilemmas

Strategic Challenges

Orientation Challenge

- *Who we are and where do we compete?*

Trade Off Challenges

- *How do we compete?*

Relevance

- *What is our value proposition? and for whom?*

Continuous Change Challenge

- *How do we adapt?*

Innovation Dilemma

- Technology Push or Market Pull
- Type of Innovation to Pursue
- Open or Closed Innovation
- Technological or Business Model

And Finally Leveraging Public R&D is about

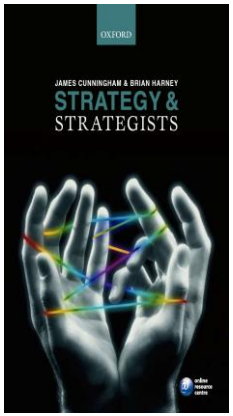
Market making, creating value add and competitiveness

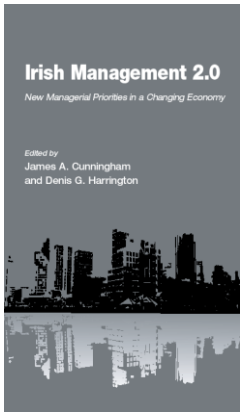
Refining and Enhancing Uniqueness, Difference and Dominance

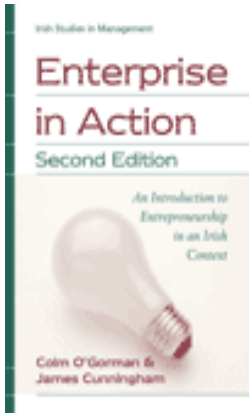
When public R&D is leveraged effectively it does challenge the industry dominant logic and current business models

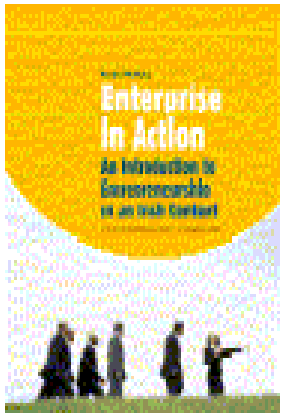
And yes it is COMPLEX and CHALLENGING

so what are you going
to do about it?









TOPIK

TRANSLATION OF
PRINCIPAL INVESTIGATORS KNOWLEDGE

Thank you

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