Institution: University of Cambridge

Unit of Assessment: 19 - Business and Management Studies

Title of case study: Innovation Policy and Technology Innovation Centres, the Centre for Business Research (CBR) team led by Professor Alan Hughes

1. Summary of the impact

Research at the Centre for Business Research (CBR) contributed to the 2010 Hauser report, which advocated the establishment of Technology Innovation Centres (TICs), and played a central part in subsequent discussions and decisions about the realisation of the report into legislation. This led to the UK government announcing a £200m programme to establish these centres, subsequently termed Catapult Centres. To date, seven Catapult Centres have been established (cell therapy, digital economy, future cities, high value manufacturing, renewable energy, satellite applications and transport) and the policy is set to expand in two further areas, energy systems and diagnostics for medicine. In July 2013, a further £185m was committed to the programme. Private sector funds are intended to bring public and private funding together on the programme to over £1 billion in the next few years.

2. Underpinning research

A long-running programme of research on the determinants of innovation performance across firms and nations and university industry knowledge exchange has been undertaken at the CBR since 1994. The key researchers were Professor Alan Hughes, (Director CBR 1994-, Director UK~IRC 2008-, Margaret Thatcher Professor Enterprise Studies Judge Business School 1998-), Mina, Senior Research Fellow (2008-, University Lecturer in Economics of Innovation, 2013-) and Connell, Senior Research Fellow (2006-). This research included comparisons of the UK and US innovations systems: university-industry links; survey analysis of commercialisation interactions of 22,000 UK academics; evaluation of the impact of 'third stream' funding in UK universities; analysis of new company formation and financing patterns in the Cambridge Silicon Fen; survey and case based analyses of innovation funding; innovation policy evaluation; and case studies of commercialisation. This led to a specific international comparative case study research carried out as part of the research award EPSRC Cambridge Integrated Knowledge Centre in Photonics and Electronics (EP/EO236141/1) (**Research Award 1**) which showed that successful intermediate technology and innovation centres combined a number of key characteristics (**Ref 1**). These included medium to long-term public sector development funding of platform technologies with the capacity to develop multilateral and bilateral private sector co-funding to enhance the quality and speed of commercialisation from the science base (**Refs 1 to 6**).

Using the information gained from its international comparative case studies, the research focussed on the generic problem of how to fund early stage commercialisation processes in general purpose technologies (GPTs). Private sector venture capital and corporate labs will typically not fund early stage GPT development because of uncertain final market applications and long lead times. Funding from key lead customers along alternative development trajectories must be combined with sustained public sector research funding to exploit the diverse end user applications which may arise. Institutional design to achieve this is a central innovation policy concern.

Specifically, fieldwork carried out in 2009 in Korea, Taiwan, USA, Germany and Belgium, published in (**Ref 1**), revealed that successful intermediate technology and innovation centres all included medium to long-term public sector funding for platform technology development. This was combined with multilateral and bilateral private sector co-funding linked to contract research. Institutional design was matched to specific national innovation systems in terms of large and small firm presence and university funding patterns. The UK lacked comparable institutions. The publication based on the research (**Ref 1**) set out a possible configuration for the UK based on these insights, and emphasised the key institutional design issues to be addressed (for details see

section 4).

3. References to the research

Publications

1 Mina, A., Connell, D. and Hughes, A. (2009), 'Models of technology development in intermediate research organisations', *Centre for Business Research Working Paper 396*, December 2009. (www.cbr.cam.ac.uk/pdf/WP396.pdf)

2 Mina, A. (2009), 'The emergence of new knowledge, market evolution and the dynamics of micro-innovation systems', *Economics of Innovation and New Technology* 18(5): 447-466.

3 Connell, D., Hughes, A. and Mina, A. (2010)**,** *Submission to House of Commons Committee on Science and Technology Enquiry on Technology Innovation Centres*, (www.publications.parliament.uk/pa/cm201011/cmselect/cmsctech/619/619vw20.htm)

4 Cosh, A. and Hughes, A. (2010), 'Never mind the quality feel the width: University – industry links and government financial support for innovation in small high-technology businesses in the UK and the USA', *Journal of Technology Transfer* Special Edition, 35:66–91, March

5 Hughes, A. (2007) 'University-industry links and U.K. science and innovation policy' in Shahid Yusuf and Kaoru Nabeshima (eds.) *How Universities Promote Economic Growth,* World Bank, Washington, D.C., 4 January

6 Hughes, A. (2008), 'Innovation policy as cargo cult: Myth and reality in knowledge-led productivity growth', in Bessant, J. and Venables, T. (eds.), Creating Wealth from Knowledge. Meeting the innovation challenge, Edward Elgar, Cheltenham. Reprinted in Augusto Lopez Claros (ed.) (2009), *The Innovation for Development Report 2009–2010: Strengthening Innovation for the Prosperity of Nations*, Palgrave Macmillan

Research Awards

1 Hughes, A, Connell, D. IKC Advanced Manufacturing Technologies for Photonics and Electronics (IKC). Funded by EPSRC, (EP/EO236141/1) 1 April 2007-31 December 2011: £395,000

2 Hughes, A., Kitson, M., Cosh, A., with Tether, B., Haskel, J., Kilduff, M., Metcalfe, S., Mina, A., Martin, B., Minshall, T. and Imperial College, London. Cambridge Imperial Innovation Research Centre (UK~IRC). Funded by ESRC, NESTA, DIUS, and TSB. 1 January 2009-31 December 2013: £2.8m

3 Kitson, M., Hughes, A., (with CIHE) Impact of Higher Educational Institutions on Regional Economy (HEIs), 1 July 2007-31 October 2009: £531,725

4. Details of the impact

The impact of this work is evidenced by the current coalition government's implementation of the policy on 'Catapult Centres', or Technology and Innovation Centres, which are designed to facilitate the translation of scientific research into commercialisation and wealth creation. This policy was a key recommendation of the 2010 Hauser Report entitled *The Current and Future Role of Technology and Innovation Centres in the UK* (**Source 1**). The key contribution of the Cambridge team was to submit evidence to the policy making process, through select committee evidence and advice, and provide input to key policy meetings at the relevant government department and cross-departmental groups. The Cambridge input, evidenced by substantive publications and competitive awards listed above, provided evidence to support this key policy development (cited in **Source 2, 7**). **Source 9** below provides a statement from a senior government official involved detailing the impact of **Source 1** in shaping the policy relating to Catapult Centres. In particular, the CBR team: developed a vision for the role of technology and

innovation centres within the UK system, provided international case studies of technology and innovation centres, provided evidence of the impact of technology and innovation centres. The role of the Cambridge team '*helped to build a strong evidence base and consensus behind the report and its recommendations. Without this, it would not have been possible to persuade the incoming Coalition Government to adopt this policy*' (**Source 9**).

Based on the findings from (**Ref 1),** the Cambridge team were directly involved in the provision of written and verbal evidence to the 2010 Hauser Review of Technology and Innovation Centres (**Source 10**). The team took part in discussions with, and submitted written advice to, Ministers before and after the 2010 election and submitted written evidence to the House of Commons Select Committee on Science and Technology (**Sources 3, 4**). **(Ref 1)** was cited several times in the Hauser Report on *The Current and Future Role of Technology and Innovation Centres in the UK*, presented to Lord Mandelson on 25 April 2010 (**Source 10**). Hughes attended policy seminars and briefing meetings in 2010 and 2011 with the Prime Minister, the Secretary of State for Business Innovation and Skills, and the Minister for Science and the Universities, the Director General for Innovation and a number of senior officials in BIS, the Technology Strategy Board, and with the OECD Innovation Policy Review Secretariat.

The recommendations in (**Ref 1)** relating to the identification of sectors for TIC investment, the scale and duration of public sector funding and the attraction of private sector co-investment were embodied in the policy announced by the government in January 2011. The Technology Strategy Board would establish a network of six to eight world-leading technology and innovation centres with funding of £200m in the four years 2011-2015 (**Source 5**). Seven 'Catapult Centres' have now been established in the areas of high value manufacturing, cell therapy, offshore renewable energy, satellite application, connected digital economy, future cities, and transport systems. Five are running in 2013, with future cities and transport systems scheduled for 2014, with chairman and chief executives having been appointed. The policy is set to expand in 2015-16 in two further areas (energy systems and diagnostics for medicine) with £185m funding added to the Technology Strategy Board from July 2013. Making the announcement of the new Future Cities Catapult, at *Innovate UK 2013*, Secretary of State for Business, Vince Cable said, '*One of the decisions of this government I am most proud of is establishing a chain of catapults across the UK. These are national centres of excellence, promoting innovation in collaboration with business*' **(Source 8).**

5. Sources to corroborate the impact

1. Hauser, H. (2010), *The Current and Future Role of Technology and Innovation Centres in the UK,* Report for Lord Mandelson, Secretary of State, Department for Business Innovation & Skills., p.6, p10, p.12, p.14, footnote 7 (www.innovateuk.org/_assets/pdf/other-publications/hauser-review.pdf)

2. Brinkley, I. (2010), *Knowledge Economy Strategy 2020: The Work Foundation submission to the Comprehensive Spending Review*, The Work Foundation, p.13 (www.theworkfoundation.com/Assets/Docs/Publications/CSR%20Submission%20FINAL%2030-9-2010.pdf)

3. House of Commons, Science and Technology Committee, *Memoranda, Written Evidence: Technology Innovation Centres, TIC 00-85*, pp. 37, 42, 274-275(www.publications.parliament.uk/pa/cm201011/cmselect/cmsctech/writev/innovation/innovation.pdf)

4. House of Commons, Science and Technology Committee, *Technology and Innovation Centres*, Second Report of Session 2011-11, Volume II, Additional written evidence, Ordered by the House of Commons to be published 15 December 2010, 12 January 2011, and 2 February 2011, pp. 19, 23, 131, 132(www.publications.parliament.uk/pa/cm201011/cmselect/cmsctech/619/619vw.pdf)

5. Technology Strategy Board (2011), *Technology and Innovation Centres: a Prospectus.*

Maximising the Commercial Impact of UK R&D ,The Technology Strategy Board, North Star House North Star Avenue Swindon SN2 1UE

6. *RSC Response to the Department for Business Innovation and Skills Consultation on the EU Framework Programme*, p.2 (www.rsc.org/images/RSC_Response_to_BIS_Consultation_on_the_EU_Framework_Programme_tcm18-197347.pdf)

7. Reid, B, Sissons, A., Brinkley, I., Levy, C., Albert, A. and Holloway, C. (2010), *Technology Innovation Centres: Applying the Fraunhofer model to create an effective Innovation Ecosystem in the UK*, Submission to the Science and Technology Committee, December, p. 6. (www.theworkfoundation.com/Assets/Docs/KnowledgeEconomynewsletters/TICs.pdf)

8. Press Release, Department of Business, Innovation and Skills, 12 March 2013 (www.gov.uk/government/news/multi-million-pound-future-cities-catapult-to-be-hosted-in-London)

9. Supporting written statement from senior civil servant, Department for Business, Innovation and Skills (28/8/13)

10. Supporting written statement from Chair of the *Hauser Review* (10/9/13)