Institution: Imperial College London
Unit of Assessment: 19 Business and management studies
Title of case study: Reorganising IBM staff and capabilities to promote customer-focused innovation

1. Summary of the impact (indicative maximum 100 words)

During a long collaboration with IBM, Professor Gann's Innovation and Entrepreneurship Group's research on organisational structure led to a better strategy for IBM to manage its external networks and open innovation. The group's research established a blueprint to recast IBM senior engineers and technologists as innovation brokers. Convinced by this research, IBM committed to retrain 600 Senior Technologists as Client Technical Advisors and Industry Architects, working with clients to leverage IBM's technical capacity and develop innovations meeting user needs. Gann's group then developed and delivered a bespoke Executive Education programme to train these IBM staff members in Europe, the US and China.

2. Underpinning research (indicative maximum 500 words)

Individual Search Behaviour

The group analysed how senior innovation staff search for knowledge external to the firm in order to develop useful innovation. Combining patent records and data obtained from nearly 700 senior innovation staff at IBM (via structured interviews, workshops, and other self-reported data), we used network analysis to model the implicit search and recognition processes used at IBM to translate available external data into actual innovation. We identified two effective search strategies: managing a large external network spending time attending to these relationships; and managing a small external network while spending time on internal connectivity. The research identified the key role of individual search champions, and the need optimally to match tasks to their particular skills. A paper has been revised and resubmitted to *Organization Science* [1].

Open Innovation

Open innovation is the free exchange of ideas today in order to develop future technologies and practices more effectively. The group undertook a comprehensive evaluation of open innovation, concluding that its potential benefit to a firm depends not merely on the type of technology but also on the innovation practices with the firm. This work was published in *Research Policy* [2] and has been the journal's most downloaded article since its publication.

Platforms for Innovation

The group considered how firms moving into service provision could create replicable processes to develop a platform or system offering innovative solutions. Focusing on IBM and BT - using over 90 interviews, workshops, and observations of strategic briefings and senior management education - we developed a strategic approach to capturing value from integrated service provision. We were also able to distinguish the various organisational levels within the firm, showing how the nature of internal networks affects the capacity to innovate. In turn, this allows recommendations for the organizational design that bests supports an open innovation strategy. This research is published in *MIT Sloan Management Review, Industrial Marketing Management* and the *Journal of Product Innovation Management* [4 - 6].

Application in Smart Cities

Smart cities complicated the innovation problem further. Digital platforms capture and reuse data from one application to enhance an activity in an apparently different application. Individual data on energy use may provide information about healthcare or transport needs, and vice versa. This complicates both the external search and the optimal internal organisation within a firm. Working

with IBM and construction firm Laing O'Rourke, the group created a framework to analyse this integration. Effective integration requires staff trained to be skilled in boundary spanning, to manage the advantages and potential pitfalls within the digital environment: this research was published in the *IBM Journal of Research and Development* [3].

Staff: Professor David Gann, Head of Innovation & Entrepreneurship Group (2003-12);
Professor Erkko Autio, EPSRC-QinetiQ Chair in Technology Transfer and Entrepreneurship (2006 - present);
Dr Andrew Davies, Co-Director, Innovation Studies Centre (2005-12);
Dr Annabelle Gawer, Assistant Professor in Strategy and Innovation (2004 – present);
Dr Linus Dahlander, Research Associate (2006-08);
Dr Ian Mackenzie, Research Affiliate (2005-11)

This research programme ran from 2005-2012 and was initially part of the £3.1M EPSRC programme grant for innovation awarded to the group in 2003 [7], subsequently renewed as the Innovation Studies Centre in 2008 [8].

3. References to the research (indicative maximum of six references)

Key Outputs

[1] Dahlander L, O'Mahony, S, Gann, D 'One Foot in, One Foot Out: How Individual Search Behaviour Affects Innovation Outcomes', R&R at *Organization Science* (available on request)

[2] Dahlander, L, Gann, D (2010), 'How Open is Innovation?', *Research Policy*, Volume 39, pp. 699-709

[3] Gann, D, Dodgson M, Bhardwaj, D (2011), 'Physical-Digital Integration in City Infrastructure', *IBM Journal of Research and Development*, Volume 55, pp. 8:1-8:10

[4] Gawer A, Cusumano M (2008), 'How Companies Become Platform Leaders', *MIT Sloan Management Review*, Volume 49, pp. 28-35

[5] Davies, A, Brady, T, Hobday, M (2007), 'Organizing for Solutions: Systems Seller vs Systems Integrator', *Industrial Marketing Management*, Volume 36, pp.183-193

[6] Gawer A, Cusumano M, (2013), Industry Platforms and Ecosystem Innovation, *Journal of Product Innovation Management* (online version, September 2013)

Grants and Related Funding

[7] Gann, D, Built Environment Innovation Centre, EPSRC, 01/04/2003 – 30/06/2008, EPSRC, £3.1M;

[8] Gann, D, Salter, A, Davies, A, Autio, E, Innovation Studies Centre, EPSRC, 01/04/2008 – 31/03/2013, £5.4M;

[9] Digital City Exchange – subsequent funding from RCUK, 01/09/2011 – 31/08/2016, £5.9M.

Evidence of quality

- Publication in journals of international quality;
- Value of competitively awarded research grants;
- End of grant review from EPSRC in 2010 awarded overall rating of 4.8 out of 5 from the EPSRC (quality of our research - 4.8, academic impact and dissemination - 4.8, relevance to the needs of industry and other research users - 4.9). Corroboration of this is available from the EPSRC Innovative Manufacturing Research Centre programme manager [A];

- 2010 paper by Gann and Dahlander (Output 2) is the most downloaded *Research Policy* article in 9 of the last 10 quarters (as at May 2013);
- Our research papers were presented at leading conferences. Acceptance to such conferences is based on peer review by the innovation studies community.

4. Details of the impact (indicative maximum 750 words)

The group's research concluded that innovation capabilities within firms such as IBM would be better served by (a) making more use of open innovation derived from ideas originating outside the firm (b) that this required outward facing staff to harness such ideas, and (c) that a vital source of such ideas were prospective users themselves, who should be engaged from the outset in conception and design. This required the creation of Client Technical Advisers (CTAs) to broker these relationships. Backroom technical expertise was no longer enough.

IBM recognised the importance of this Imperial research, then commissioned Gann's group to develop the strategic business case to facilitate its adoption within IBM. This was achieved successfully: IBM decided to create 600 CTAs. By 2013, 300 of these posts had been created via this multi-year transformation programme.

IBM decided to commission Gann's group to help train these new CTAs through a bespoke programme - 'Leading Radical Innovation' - for prospective CTAs, helping them identify opportunities using analytical tools and frameworks, advocate solutions by using particular processes to encourage client creativity, and implement adoption through the development of interpersonal skills and approaches to engagement.

To confirm the reach and significance of this impact, and IBM's commitment to the change in organisational structure, this programme is being delivered three times a year to 20-25 former Senior Technologists at IBM bases in the UK, US and Asia. In developing the CTAs, Imperial can document the clear sequence:

- Excellent original research on individual search behaviour and the effective structures to manage open innovation;
- Recognition of this by IBM;
- Commissioning Imperial to develop a business model for its implementation;
- Commissioning Imperial to facilitate significant organisational change within IBM on a global scale.

The impact of this for IBM was described by the Vice-President, IBM Academy of Technology & University Relations [B]:

> "I am pleased to confirm the benefits we have enjoyed from Imperial's original research with my colleagues in IBM between 2008 and 2009. This research clarified ideas on ways in which engineers and technologists create value by brokering knowledge across traditional boundaries. The study and your subsequent consulting advice provided thought-leadership that shaped the creation of IBM's Client Technical Advisor (CTA) role. Since implementation in 2009, more than 300 senior IBM technical leaders have moved into new CTA roles. We are pleased that Imperial College provides on-going support in developing their capabilities through a custom-made executive education programme 'Leading Radical Innovation'. IBM benefits enormously from the CTA role and we estimate that in the past three years, the CTA program has contributed directly to IBM's revenue growth in our strategy growth areas."

The Vice-President Emeritus of the IBM Academy of Technology has also attested to the value of the Innovation and Entrepreneurship Group's research in service innovation and the company's long-term relationship with the Group, explicitly noting that IBM's development of the CTA position "was inspired by research on the activities of technologies as boundary-spanners starting in a

project between the Innovation & Entrepreneurship Group and IBM's teams at Hursley UK." [C]. The President of the IBM Academy of Technology, provides confirmation of the School's role in helping IBM to adopt this new role, attesting that "a bespoke Executive Education programme…gives our technical leaders the ability to interact more effectively with customers, understand the changing business context in which they operate and develop creative solutions with strategic value to IBM." [D].

We estimate IBM's eventual investment in the CTA role will be $90M: 600 people on an average salary of $140k per annum, plus fees and time allocated to our executive programme. If IBM anticipate a return of at least 15% pa to establish such a programme, this implies that the eventual benefit to IBM will exceed $13M per annum.

Subsequent developments

The impact of this project goes beyond the transition to CTAs. Its success allowed Imperial to build a deeper relationship with IBM leading to new research with new impact. The Digital City Exchange (DCE) is a five-year programme to investigate these issues and IBM is working with us to harness the latest in digital systems thinking across firms and industries to transform the planning and use of cities, creating integrated infrastructure and services, such as transport and utilities. We are also working in this programme with Arup, Sainsbury's, Transport for London, Imperial College Healthcare Trust and the National Grid.

Further evidence of the depth of the ongoing Imperial-IBM partnership, in both directions, is that the former Chairman of IBM Europe [E] now chairs Imperial's Digital Economy Lab; the President IBM Academy of Technology [D] serves on the Advisory Board of the UK Innovation Research Centre (joint Cambridge–Imperial), and the Vice-President Emeritus, IBM Corporation [C] is a visiting researcher. All three are Adjunct Professors in Imperial College Business School.

5. Sources to corroborate the impact (indicative maximum of 10 references)

[A] Programme manager, EPSRC Innovative Manufacturing Research Centre;

[B] Vice President, IBM Academy of Technology & University Relations;

[C] Letter of support from the Vice-President Emeritus, IBM Corporation;

[D] Letter of support from the President IBM Academy of Technology;

[E] Former Chairman, IBM Europe, the Middle East and Africa.