

Technology Management

The newsletter of the Centre for Technology Management (CTM)

March 2014

Nine new research projects set up STIM's second year

Building on the success of the 2013 Strategic Technology and Innovation Management programme, STIM 2014 has now been launched. Twelve companies from a range of industries have joined so far, with more expected to follow. The aim of the programme is to enable industrially-relevant research, network and practice sharing. A portfolio of nine research projects is being pursued, summarised below.

1 How technology intelligence is assimilated in decision making:

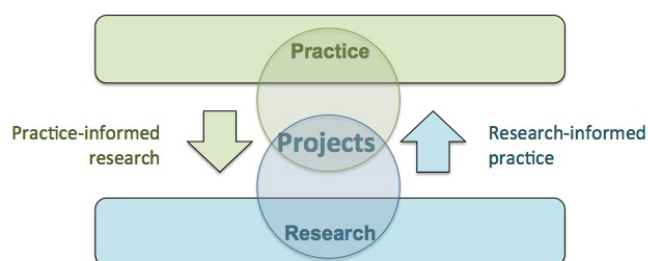
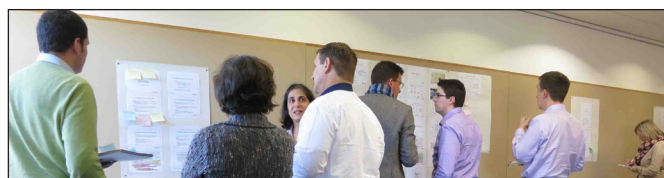
It focuses on the progression of decision makers' awareness of emerging technologies to identify how these are increasingly important in strategy. It builds on previous work on technology intelligence and how it is communicated and perceived. Contact: Dr Letizia Mortara (lm367@cam.ac.uk)

2 'Marketing' process for technology: The project aims to develop an approach to identify problems a technology can solve, at the earlier stages of innovation, to enhance the exploitation opportunities. It builds on previous work on technology marketing and intelligence. Contact: Clare Farrukh (cjp22@cam.ac.uk)

3 Project portfolio selection for pre-commercial investigations: It will explore how organisations appraise and select pre-commercial technological (and other) competences, in order to invest in their development. It builds on previous work to develop guidance for selecting projects at a stage where commercial exploitation is envisaged. Contact: Prof Rick Mitchell (rfm26@cam.ac.uk)

4 Opportunities at the intersection between crowdsourcing and crowdfunding – capturing the 'white space' of R&D: 'White space' opportunities are those with a poor fit to the current organisation and customers (new and existing) being served in fundamentally different ways. This project will explore exploiting emerging crowdsourcing and crowdfunding internet platforms. Contact: Dr Chris van der Hoven (cvdh@cantab.net)

5 Innovation simulation: Innovation education is essential to improve skills and decision-making of those involved in the innovation process. This project aims to develop an innovation simulation to help firms better understand the challenges of allocating resources when developing and launching new products, building on previous experience



with educational simulation activities. Contact: Dr Simon Ford (sjf39@cam.ac.uk)

6 Scalable toolkit platform: Uptake and utilisation of management tools is a challenge in industry; especially given the need to select, adopt and integrate individual tools into a toolkit to implement within current organisational processes and systems. This project will attempt to generate a scalable toolkit platform, through leveraging previous research and industrial engagements. Contact: Dr Clive Kerr (civk2@cam.ac.uk)

7 Visualising portfolios: Portfolio perspectives are fundamental for managers and their common depiction is a basic 'bubble' chart. Typically, the execution of such visuals is relatively poor and lacks a robust approach to presentational style and information content. Taking an approach that attempts to balance data provision with the needs of users for information comprehension, this project will develop a prototypal visual representation for depicting portfolios. Contact: Dr Clive Kerr (civk2@cam.ac.uk)

8 Value creation and capture: Value creation for firms involved in R&D and product launch presents many challenges. Recent research highlighted the need to track the value of work done in the realisation states of a product. This project builds on this research, focusing on communicating information between stakeholders involved in assessing options, and ways the decisions taken can be tracked to project outcomes and value created. Contact: Val Lynch (vbt21@cam.ac.uk)

9 Issues for R&D location with a focus on China: China has been one of the preferred destinations for companies to leverage its labour dividend and fast-growing domestic market. However, is China a suitable location for R&D activities? The project aims to develop a checklist of important issues that a company must consider. Contact: Quan Zhou (qz249@cam.ac.uk)

For more information please visit the STIM website (www.ifm.eng.cam.ac.uk/research/ctm/stim) or contact Rob Phaal (rp108@cam.ac.uk).

East meets West – new insights from research exchange project



The EU-funded Europe China High Value Engineering Network project

(EC-HVEN) project focuses on encouraging research exchange between Chinese and European universities, particularly young researchers. In the last few months this has really got under way, and we hope this will lead to long-lasting

research co-operation. CTM is involved in two main areas of work. The first exchanges, develops and applies advanced methods to analyse and guide industrial emergence based on new technologies and novel engineering capabilities. The second exchanges knowledge and research methods on engineering design and innovation from different cultural perspectives in

Europe and China. In the last six months there have been several exchange visits which add real value to our ongoing research. The project runs until April 2016, so there will many more opportunities for young researchers to experience the conditions in each others' countries, and build the basis for future collaboration.



Elliott More recently travelled to China as part of his PhD research to understand how resource scarcity influences strategy development in manufacturing firms. His research aims to improve the current understanding of how decision makers perceive and act to address future resource shortages.

Elliott was based at Tsinghua University in Beijing for four months, however his research involved making use of the high-speed trains to travel all over China to conduct interviews, run workshops and attend conferences. During this process he travelled to Shanghai, Tianjin, Kunming, Guilin, Guangzhou and Hong Kong.

Conducting interviews provided the opportunity to hear first-hand about the challenges being faced by firms to balance economic growth with social and environmental concerns. Indeed Elliott found many firms are dealing with similar strategic challenges to manufacturers in the UK, and there exists similar limited concern about long-term resource scarcity given more pressing short-term commercial pressures to stay financially afloat

and deliver in highly competitive markets.

Alongside the interviews, the exchange provided the opportunity to run two roadmapping workshops. The first was in collaboration with the BP Clean Energy Centre at Tsinghua and examined the future of intermittent power generation in China up to 2050 (see the China power pathways workshop report, right). The second was a bespoke strategic roadmapping session for a start-up sustainable property developer in the heart of Beijing.

Elliott found roadmapping relatively well used in China. It was found to be a well-regarded technology management tool in manufacturing firms in a diverse number of sectors, as well as a strategic tool for industry level planning. For example, Tsinghua University is currently facilitating 12 industry-level roadmaps for the Government which will be completed in late 2014.

Some recurring themes arose out of many conversations and interviews held across China. As labour costs surge, many firms spoke of the pressing need to increase labour productivity by embracing new technologies such as advanced robotics and big data. Along a similar vein, many manufacturing firms spoke of the urgent need to move up the value chain and become product innovators by developing world-leading research and development centres, making use of the flood of talented young graduates leaving China's elite universities as well as those returning from the US and Europe.

For more information on his research, or to speak to Elliott about his experiences, email him at egm27@cam.ac.uk.



Power pathways workshop

Simon Ford and **Elliott More** ran a workshop at the Tsinghua-BP Clean Energy Centre at Tsinghua University on 21-23 October 2013. The focus was the challenge of integrating intermittent power generation into China's electricity network.

The workshop made use of technology roadmapping techniques. Both Chinese and international perspectives were represented, with Tsinghua University and BP joined by Chinese energy experts from State Grid, the National Development and Reform Commission, the National Development and Investment Corporation, Shanghai Electric Group and Huaneng Group, as well as French electric utility EDF.

The workshop had three elements: (1) the development of a historical map to identify how the current state of China's electricity network has developed; (2) the generation of multiple scenarios for China's energy situation in 2050; and (3) the creation of a technology roadmap that identifies some of the potential actions necessary to realise one of these scenarios (the "desired vision").

A report summarising both the workshop process and the results of the three activities is now available. The most significant of these outputs is a set of recommendations for the actions necessary to achieve the "desired vision". These include the development of an aligned strategy for the integration of power generation and transmission, energy price deregulation through the removal of subsidies, and further investment into the R&D of energy storage technologies.

For a copy of the report contact Simon Ford (sjf39@cam.ac.uk).



Visiting students

We welcome two visiting doctoral students from China under the EC-HVEN programme, who will each be staying with us for one year.

Quan Zhou joined in



November 2013, under the supervision of Dr Yongjiang Shi and David Probert. His home institution

is the School of Management, Zhejiang University. He graduated with a MSc in eCommerce from Dublin City University (2006) and a BA in Computer Science from Hangzhou Dianzi University (2005). He has worked as an assistant lecturer at Zhejiang Shuren University. His research interests include innovation management, business model innovation and technology

entrepreneurship. His PhD investigates Chinese multinational companies' overseas R&D activities and how they balance exploration and exploitation activities. He will participate in the STIM Consortium, aiming to help firms identify challenges in managing R&D in China.

Michelle Chen Xiaohong

joined CTM as a visiting doctoral student in December 2013 from the School of Public Policy & Management, Tsinghua University. She will be researching open innovation and technology sharing under the supervision of David Probert and Tim Minshall as part of the EC-HVEN project. Her particular research interest is knowledge sharing in the Open Source Software (OSS) community.



Corporate Chinese comparisons

Clemens Chaskel visited Tsinghua University for six weeks from October 2013 to work on a multi-industry comparison study focusing on the link between corporate and technology strategy in Chinese industry. Industrial strategy formulation processes and tools such as portfolio management and roadmapping were assessed in the Chinese context.

The findings showed strategic issues faced by Chinese firms are comparable in most cases to European firms and that, in principle, strategizing approaches can follow similar paths. However, workshop-oriented tools such as technology roadmapping may be less effective and may need adaptation in China due to the different organisational behaviours and market dynamics. Also, stricter organisational hierarchies and hierarchically oriented social cultures may mean workshop-based activities such as group discussions may not bring the same immediate "brainstorming" benefits as in European firms. The findings will be incorporated into ongoing research to develop an integrated technology strategy framework, due to be completed later this year.

Data was provided by firms such as Lenovo, China Mobile, BOE and LiuGong, through interviews with senior stakeholders in the field of technology management.

People

Imoh Ilevbare recently completed



his PhD under David Probert and Rob Phaal, with his thesis entitled "An investigation into the treatment of uncertainty and risk in roadmapping: a framework and a practical process." Imoh continues to work and maintain contact with CTM while in his tool development role at the IfM ECS.

Val Lynch is very pleased to report that following part-time study, her thesis entitled "Investigation into the value of embedded software", paved

the way for the award of PhD on 22 February.

She says: "I started with a nagging question, 'What is embedded software worth?', and the research concentrated on analysing ways in which companies capture the value of assets created throughout embedded software development projects. The conclusion is that a new approach, based on a value perspective of project work, could be helpful in answering that question. The next stage is to begin trialling the approach over the following 12 months."



Contact valerie.lynch@andtr.com.

Nitish Gupta is a final year MBA student from Birla Institute of Technology & Science (BITS-Pilani), Pilani campus, India. He will be writing his master's dissertation related to project portfolio selection for pre-commercial investigations, one of the STIM 2014 projects. He is working under the supervision of David Probert, Rob Phaal and Rick Mitchell. He worked on the Technology Leadership and Deployment project in STIM 2013.



Bit by Bit makes additive progress

Researchers at CTM have received funding from the EPSRC and ESRC to investigate the potential impact of 3D printing on UK manufacturing. The project is split into three broad phases, looking at the emergence of the 3D printing industry, the impact this technology is having on business models in a range of industry sectors, and possible future scenarios for the wider impact of 3D printing.

Initial research efforts are being targeted at a historical study of 3D printing equipment manufacturers, and early adopters of 3D technologies in aerospace, automotive, consumer manufacturing and non-surgically implanted medical devices.

To get guidance from relevant stakeholders, the project team created an Advisory Network of academics, policymakers and industrialists. At the inaugural meeting

in December, representatives from a wide range of organisations including the BSI, the Centre for Science and Policy, the Centre for Science, Technology and Innovation Policy, Dyson, the IET and NESTA contributed their ideas on specific challenges researchers should investigate.

Throughout the project, the research team will be hosting academic visitors whose interests align with the project's aims. The first is **Dr Christian Sandström** from Chalmers University. His study of the adoption of 3D printing in the hearing aid industry indicated that while it provided some efficiency and cost benefits to manufacturers, its adoption caused very little impact on the competitive position of the companies in the industry.

The project team is using social media to engage people with the work. You can follow our updates on the webpage at www.dfab.info, the blog at <http://capturingthevalue.wordpress.com>, and via Twitter by following [dfab_info](https://twitter.com/dfab_info).

Technology management research at Cambridge

- Strategic technology management
- R&D project selection
- Software sourcing in manufacturing
- Enhancing creativity in new product development
- New product introduction collaboration
- Technology management: a process approach
- Technology selection
- Technology evolution in hi-tech firms
- Innovation management in hi-tech firms
- Emergence of technology based industry
- Technology scanning and intelligence
- Technology acquisition
- Technology protection
- Strategic make-or-buy
- Industrial make-or-buy decisions
- Sustainability and technology insertion
- Technology valuation
- Technology foresight

Duo present DRUID papers

PhD students **Joonmo Ahn** and **Bettina Blasini** attended the DRUID Academy 2014 conference in Aalborg, Denmark on 15-17 January. The conference covered the economics and management of innovation, entrepreneurship and organizations, and around 70 papers were presented.

Joonmo presented his PhD work entitled "Linkage between CEO characteristics and open innovation adoption in innovative SMEs". He suggested new open innovation taxonomy according to required skills for open innovation implementation and showed this classification can be linked to CEO characteristics based on his survey data analysis. Bettina presented her paper "The role of communicators in innovation clusters: Initial evidence from the case studies Munich and Cambridge." Pursuing an interdisciplinary approach to communication studies and cluster theories, Bettina discussed the results of her qualitative interview analysis, which aims to contribute new insights to both research fields.

Building on Mexican collaboration

Building on previous collaboration, **Alejandro Torres Padilla** from DUX will visit for a year, starting in March, together with periodic visits from **Ricardo Gonzalez Nakazawa** from NCG. Alejandro will focus on developing the theoretical foundations for practical strategy workshop methods being developed and tested in Mexico. We share an interest in the development and dissemination of efficient, sustainable well-founded practical methods.

New publications

Ahn, J, Mortara, L, and Minshall, T (2014): Linkage between CEO characteristics and OI adoption in innovative SMEs, DRUID Academy, 15-17 January, Aalborg, Denmark.

Blasini, B, Minshall, T, and Mortara, L (2014): The role of communicators in innovation clusters: Initial evidence from the case studies of Munich and Cambridge, DRUID Academy, 15-17 January, Aalborg, Denmark.

Minshall, T, Kouris, S, Mortara, L, and Weiss, D (2014): Developing infrastructure to support open innovation: Analysis of case studies in the East of England, International Journal of Innovation & Technology Management 11 (1).

Mohr, V, Garnsey, E, and Theyel, G (2014): The role of alliances in the early development of high-growth firms, Industrial and Corporate Change, Vol 23, pp233-259. doi: 10.1093/icc/dtt056

Tim Minshall and **Letizia Mortara** have co-edited *Strategy and Communication for Innovation*, published by Springer. This book makes a contribution to research on innovation communication by providing multiple perspectives on the latest research on innovation communication and strategic open innovation. It also provides guidance for managers seeking to understand the diverse ways by which they can leverage communication to support successful innovation. Tim and Letizia have written a chapter with **Bettina Blasini** and **Dr Rani Dang**, a former visitor to IfM. **Simon Ford** and **David Probert** contributed a chapter with former CTM member **Simone Ferriani**. See <http://www.springer.com/business+management/technology+management/book/978-3-642-41478-7>

Diary 2014

www.ifm.eng.cam.ac.uk/events

March 2014

25 to 27

Technology and innovation management

Three-day course
Jesus College, Cambridge

May 2014

20

Visual approaches for strategy and innovation management

One-day course
IfM, Cambridge

June 2014

11 and 12

Strategic roadmapping

Two-day course
IfM, Cambridge

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