

# Technology Management

The newsletter of the Centre for Technology Management (CTM)

March 2015

## 3DP-RDM: Defining the research agenda for 3D printing-enabled re-distributed manufacturing

In December 2014, the CTM-based 'Bit by Bit' 3D printing research project team secured further funding to explore the interrelationships between 3D printing/additive manufacturing and re-distributed manufacturing.

The new two-year project "Defining the research agenda for 3D printing-enabled re-distributed manufacturing" (3DP-RDM) is part of the EPSRC's "Manufacturing the Future" theme and is being funded through the EPSRC/ESRC's recent "Re-distributed Manufacturing Call for Networks". The project is led by **Dr Tim Minshall** (PI) at the Institute for Manufacturing, and by Prof. Phill Dickens (Co-I) at the University of Nottingham, and is supported by **Dr Simon Ford** in a Network Coordinator role.

The objective of 3DP-RDM is to convene a multi-disciplinary research and multi-industry user network that provides the required breadth and depth of research capabilities to define and disseminate the research agenda for 3DP enabled re-distributed manufacturing. The formation of this community will provide a platform for the delivery of a portfolio of up to six research feasibility studies to explore:

- The features of 3DP technologies that help enable re-distributed manufacturing;
- How re-distributed manufacturing may accelerate the diffusion of 3DP technologies, and vice-versa;
- Sector specific and generic aspects of 3DP enabled re-distributed manufacturing.

The network launched on 30th January with a Scoping Workshop at the IfM that was facilitated by Simon Ford. It brought together 37 academics and industrialists to explore what research topics should be conducted through feasibility studies in the first year of the network.

The workshop consisted of two main discussion activities. In the first, multi-disciplinary groups were given the task



of answering the question: "What are the research issues at the intersection of 3D printing and re-distributed manufacturing?" The top five research topics for each group, written on post-it notes, were then placed on a landscape map and participants then prioritised them using a dot voting method.

In the second discussion activity, new groups were formed based around interest in the prioritised topics. The topics explored were: (1) Material supply chain; (2) Standards, compatibility, regulation and certification; (3) Reconfiguring supply chain: will consumers become prosumers; (4) Software and conceptual infrastructure; (5) How will value be created and captured in 3DP-RDM economy?; (6) Who owns/shares designs in 3DP-RDM hubs, and (7) Business models.

The outputs of the workshop informed academics who planned to submit proposals to the feasibility study competition. These submissions are currently under review. The successful proposals will be conducted during 2015, with the results shared at an event in January 2016.

For more information about the network, visit [capturingthevalue.wordpress.com](http://capturingthevalue.wordpress.com) or contact Simon Ford [sjf39@cam.ac.uk](mailto:sjf39@cam.ac.uk)

### R&D Management Conference, 2-6 July 2016

In July 2016, CTM will host the international R&D Management conference in Cambridge at Queen's college, and we look forward to welcoming over 200 delegates from around the world. The program will feature key contributions from leading academics and industrialists. Sponsoring possibilities are available. If you would like to get involved, please contact **David Probert** [drp1001@cam.ac.uk](mailto:drp1001@cam.ac.uk)

Further information can be found at [www.rnd2016.eu](http://www.rnd2016.eu) or our webpage [www.ifm.eng.cam.ac.uk/events/radma-2016](http://www.ifm.eng.cam.ac.uk/events/radma-2016)

## Bit by Bit project updates

Now entering its second year, the UK-RC sponsored "Bit by bit: capturing value from the digital fabrication revolution" project is shifting focus: from the analysis of the historical process of emergence and adoption of the additive manufacturing and 3D printing technologies in industry, to evaluating how they might impact industry with disruptive scenarios and the emergence of new business models.

The Bit by Bit project has strong links with the research activities carried out within the new "3DP-RDM: Defining the research agenda for 3D printing-enabled re-distributed manufacturing" research network, and projects supported via the STIM programme.

The Bit by Bit and 3DP-RDM team are also helping with the development of the UK National Strategy for Additive Manufacturing.

For updates and opportunities of engagement follow us on our webpage [www.dfab.info](http://www.dfab.info), blog [capturingthevalue.wordpress.com](http://capturingthevalue.wordpress.com) and Twitter [@dfab\\_info](https://twitter.com/dfab_info)

## STIM 2015

The Strategic Technology & Innovation Management (STIM) Consortium is a practice-oriented research and networking collaboration between industrial member companies and the Centre for Technology Management. Now in its third year, STIM 2015 includes an active portfolio of 11 research projects covering a range of technology and innovation management topics of practical and theoretical interest.

Networking and knowledge exchange between companies is becoming a more prominent part of the STIM programme, enhanced by the diverse range of sectors and national perspectives provided by the companies involved.

If you would like to find out more, or are interested in joining the STIM consortium, please contact **Dr Robert Phaal** [rp108@cam.ac.uk](mailto:rp108@cam.ac.uk), +44 (0)1223 765824.

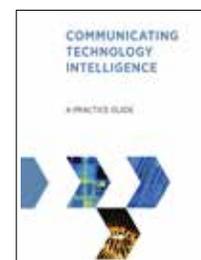


## New practice guide for communicating Technology Intelligence

CTM has published a new Practice Guide: "Communicating Technology Intelligence", written by **Dr Letizia Mortara**.

This guide aims to improve the understanding of 'insight delivery' or how intelligence can be better communicated to decision-makers by exploring the cognitive barriers affecting decision-making and proposing practical approaches to minimise their impact.

The guidebook can be downloaded from [www.ifm.eng.cam.ac.uk/research/ctm/ctmpublications/ctmreports/technology-intelligence](http://www.ifm.eng.cam.ac.uk/research/ctm/ctmpublications/ctmreports/technology-intelligence)



## New course format: Evaluating and selecting technology-based projects

For 2015, CTM has updated its popular course on technology valuation to include the latest research on evaluation methods. The new format will have greater emphasis on multi-factor scoring for prioritising and choosing between projects. Implementation guidance will be provided on designing suitable scoring criteria, scaling statements and anchoring, adaptations for front-end projects, and process management. Other tools that will be covered include portfolios, value roadmapping, options and decision trees.

The first public course will take place on the 16th April. Additionally, there are opportunities for in-company training, research and consulting engagements. Please contact **Dr Clive Kerr** [civk2@cam.ac.uk](mailto:civk2@cam.ac.uk) for more information.

## Druid Academy Conference

CTM PhD student, **Yuta Hirose** attended the Druid Academy Conference 2015 in Aalborg, Denmark on 21-23 January. The conference theme covered the economics and management of innovation, technology and organisations. Yuta presented his PhD work titled 'A conceptual framework for exploring the scalable integration of roadmapping and innovation system functions for industrial emergence'. He suggested that exploring the integration opportunities between roadmapping and innovation system functions in a scalable manner by unifying dimensions and units of analysis will provide a new perspective and useful insights on the theory and practice of both roadmapping and innovation system functions. There were about 70 papers presented at the conference.

## High Impact Framework For Innovation (HiFFi) in the 'Touch Room'

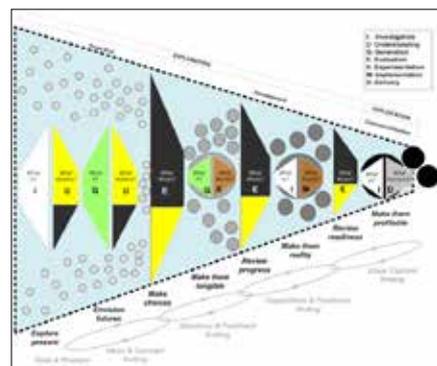
Theoretical and practical work on the HiFFi project continues, developing a sound approach for deploying Strategic Innovation Systems within organisations.

The approach aims to provide a framework and tools to assess and implement an agile and adaptable innovation system for managing portfolios and projects efficiently along the full innovation cycle: from ideas to value delivery and capture (see figure). The customisation, integration and orchestration of tools are supported by roadmapping approaches where knowledge is updated in collaborative and visual 'Touch Room' sessions.

The approach is being developed in collaboration with two organisations

(DUX Diligens and Nakazawa Consulting Group). **Dr Alejandro Torres Padilla** from DUX will be spending a second year in Cambridge as a visiting scholar, with **Ricardo Gonzalez Nakazawa** visiting regularly. We would welcome companies interested in working with us to develop and test the approach.

Contact: Dr Alejandro Torres-Padilla [at686@cam.ac.uk](mailto:at686@cam.ac.uk)



### Open Evening 2015

The annual IfM Open evening on 29th January drew its usual wide spectrum of interested people from mainly local organisations. All activities of the IfM were on display, and judging from the interest of visitors to the CTM stand, local could mean anything up to 100 miles away!

Developments in current research (STIM and Bit by Bit) were featured in posters, and our publications were on display.

Several CTM staff and students were on hand to answer questions, and deal with the many enquiries about how to engage further with the work of the Institute, including some long lost alumni wishing to reconnect with the work of CTM/IfM.

### 1st World Open Innovation Conference

CTM researchers **Letizia Mortara**, **Joonmo Ahn** and **Tim Minshall**, and **Ivanka Visnjic Kastalli** from the Cambridge Service Alliance/ESADE attended and delivered papers at the inaugural World Open Innovation Conference in California., where academics and industrialists discussed emerging trends in open innovation. Slideshow: [youtu.be/jEGa98r-KCw](http://youtu.be/jEGa98r-KCw); summaries: [blog.openinnovation.net](http://blog.openinnovation.net)

The event also served as an informal launch event for the latest book edited by Chesbrough, Vanhaverbeke and West on "New Frontiers in Open Innovation" to which Letizia Mortara and Tim Minshall contributed a chapter – see [amzn.to/1wCMLbD](http://amzn.to/1wCMLbD).

We were also delighted that the paper presented by **Joonmo Ahn**, "Has Open Innovation Enhanced Firm Performance in an Economic Downturn?", is one of the 12 papers to be included in a special issue of Industrial and Corporate Change.

## People

Our PhD student, **Joonmo Ahn** has successfully passed his viva titled "The human side of openness: the influence of CEOs on open innovation in innovative SMEs" in December 2014. He is now at the Office of R&D policy, the Korean government agency, Ministry of Science, ICT and Future Planning (MSIP) promoting out-bound open innovation in public sectors. He hopes to continue to collaborate with CTM in the near future. You can contact Joonmo on [jmahn@msip.go.kr](mailto:jmahn@msip.go.kr), [ahn.joonmo@gmail.com](mailto:ahn.joonmo@gmail.com)



**Tom Oberquelle** is visiting CTM from February to April 2015. He is a Master's level student at Kiel University, working on his dissertation project with Frank Tietze. Tom studies how sharing products among users (e.g. equipment, tools, vehicles) impacts the way these users innovate. While at the IfM, Tom will design and conduct a survey amongst different user groups.



**Nitish Gupta** is a first year PhD student under the supervision of David Probert and Rob Phaal. He was a Research Associate in Management of Technology at Tokyo Institute of Technology, Japan until September, 2014. He has been earlier involved in STIM consortium in 2013 and 2014. Nitish holds MBA from BITS-Pilani and has gained a year of industrial experience at Tata Consultancy Services, India.



On December 15th 2014, **Bettina Blasini** passed her Viva with minor corrections. She started her PhD in 2012 under the supervision of Tim Minshall and Letizia Mortara. Her thesis investigated the research question "What is the Role of Communicators in Innovation Clusters?" by bringing together the research fields cluster theories and communication studies and conducting data from the two innovation clusters Munich and Cambridge. The interdisciplinary study was examined by the internal examiner Chander Velu and the external examiner Markus Behmer, professor of communication studies at Bamberg University. Bettina moved back to Munich and is currently working on her corrections and applying for post-doc positions.

**Clemens Chaskel** recently completed his PhD with focus on the link between technology and corporate strategy. His thesis provides a framework for auditing and shaping strategic planning related management processes and tools that helps firms to establish an integrated technology strategy. Such an approach may enable firms to closely integrate and exploit their technical capabilities during strategic planning activities, strengthening their competitive position. Clemens now works as an Industrial Fellow for IfM ECS and provides services based on our research to medium and large organisations.



## New publications

Ahn, J. Minshall, T., Mortara, L., (In Press), 'Open innovation: a new classification and its impact on firm performance', Special Issue: Open Innovation and Firm's Performance, Journal of Innovation Management.

Ahn, J.M., Mortara, L. and Minshall, T., (2014), 'Has Open innovation Enhanced Firm Performance in an Economic Downturn? A Longitudinal Comparison Between the UK and Korea', In: the 1st Annual World Open Innovation Conference, 4/12/2014 to 5/12/2014, Napa, US.

Ahn, J. M., Minshall, T. and Mortara, L., (2014), 'Open innovation: an approach for enhancing firm performance', Open innovation research forum working paper, Cambridge, UK: Institute for Manufacturing.

Ahn, J.M., Mortara, L. and Minshall, T., (2014), 'The linkage between CEO characteristics and open innovation adoption in innovative manufacturing SMEs', In: DRUID Academy 2014 Conference, 15-1-2014 to 17-1-2014, Aalborg, Denmark.

Blasini, B., Dang, R.J., Mortara, L. and Minshall, T., (2014), 'The Role of Communicators in Innovation Cluster', In Pfeffermann, N. Minshall, T., Mortara, L. (Eds.) Strategies and Communication for Innovation. Springer Verlag.

Bocken, N.M.P., Rana, P., Athanassopoulou, N., Llevbare, I. and Phaal, R., (2015), 'A strategy process for early stage ventures to develop sustainable value opportunities', 2nd International Conference on Sustainable Design and Manufacturing, Seville, 12-14 April.

# 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

Göldner, M., Herstatt, C., & Tietze, F., (2015), 'The emergence of care robotics – A patent and publication analysis', *Technological Forecasting and Social Change*, 92 (March), p115-131.

Hirose, Y., Phaal, R. and Probert, D., (2015), 'A Conceptual Framework for the Scalable Integration of Roadmapping and Innovation System Functions for Industrial Emergence', In: DRUID Academy Conference 2015, 21/1/2015 to 23/1/2015, Aalborg, Denmark.

Mortara, L., (2015), 'Communicating Intelligence', Institute for Manufacturing. University of Cambridge. 978-1-902546-49-0.

Mortara, L. and Minshall, T., (2014), 'Patterns of implementation of Open Innovation in multinational companies', In, Chesbrough, H. Vanhaverbeke, W. West, J. (Eds.) *Open Innovation: New Research and Developments*. Oxford University Press.

Mortara, L. and Parisot, N., (2014), 'A Cluster Analysis of Fab-Spaces' Business Model', In: the 1st Annual World Open Innovation Conference, 4/12/2014 to 5/12/2014, Napa, US.

Mortara, L. and Minshall, T., (2014), 'Patterns of implementation of Open Innovation in MNCs', In 'New Frontiers in Open Innovation' external, Henry W. Chesbrough, Wim Vanhaverbeke, Joel West (editors) – Oxford University Press. Downloadable from <http://bit.ly/1wrb1e6>

Mortara, L. and Roijackers, N., (2014), 'Open Innovation innomediaries: Exploring managerial barriers to successful collaborations', World Open Innovation Conference, Silverado Resort, Napa Valley, 4-5 December 2014.

Ortiz-Gallardo, V. G., Tietze, F., Probert, D., & Phaal, R., (2014), 'Technology acquisition through collaboration: Practical insights for technology suppliers', *International Journal of Technology Intelligence and Planning*, 10(1), 67-85.

Park, I., Jeong, Y., Yoon, B. and Mortara, L., (2014), 'Exploring potential R&D collaboration partners through patent analysis based on bibliographic coupling and latent semantic analysis', *Technology Analysis and Strategic Management*. 1-23.

Pfeffermann, N., Minshall, T., and Mortara, L., (Eds.) (2014, XVII), 'Strategy and Communication for Innovation', 2nd ed., 465p. <http://www.springer.com/business+and+management/technology+management/book/978-3-642-41478-7>

Shawcross, J. K. and Ridgman, T. W., (2014), 'Completing the SIP activity framework – what through placement activities should they, and do they, do?', SEFI 2014. Birmingham, UK.

Shawcross, J. K. and Ridgman, T. W., (2014), 'Short Industrial Placements - developing an activity based framework to support teaching and learning', *Higher Education, Skills and Work-Based Learning*, 4, 3.

Sugihara, T., Fujinami, T., Phaal, R. and Ikawa, Y., (2015), 'A technology roadmap of assistive technologies for dementia care in Japan', *Dementia*, 14 (1), pp. 80-103.

Tietze, F., Pieper, T. and Herstatt, C., (2014), "To own or not to own: How ownership impacts user innovation—An empirical study." *Technovation* 38 (April), 50-63.

Zhou, Y. and Minshall, T., (2014), 'Building global products and competing in innovation: the role of Chinese university spin-outs and required innovation capabilities', *International Journal of Technology Management* Volume 6, Special issue: Global Products from Innovation Labs in Developing Countries (2/3/4): 180 - 209.

## Diary 2015 [www.ifm.eng.cam.ac.uk/events](http://www.ifm.eng.cam.ac.uk/events)

### March

12	<i>Strategic Roadmapping</i>	One-day course IfM, Cambridge
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### March

24-26	<i>Technology and Innovation Management</i>	Three-day course IfM, Cambridge
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### April

16	<i>Evaluating and selecting technology-based projects</i>	One-day course IfM, Cambridge
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