

IfM BRIEFING DAY

TUESDAY 13 MAY 2014

IfM | CAMBRIDGE | UK

A day of interactive sessions for senior industrialists and policymakers presenting the latest research, approaches and practical applications from the Institute for Manufacturing

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PROGRAMME

09:15 REGISTRATION

09:45 WELCOME

What's new at IfM

Mike Gregory

SESSION 1 – PLENARY

10:00 **The future of manufacturing**

Dai Morgan

10:20 **UK high value manufacturing landscape**

Andrew Gill

10:40 **Science, technology and innovation policy**

Eoin O'Sullivan

11:00 **Capturing value from global networks**

Jag Srai

11.20 **Developing manufacturing talent**

Judith Shawcross

11:30 REFRESHMENTS

12.00 SESSION 2 – PARALLEL

Three parallel sessions – please select one

Roadmapping for strategy and innovation

Rob Phaal and Jim Trueman, Lecture Room 1

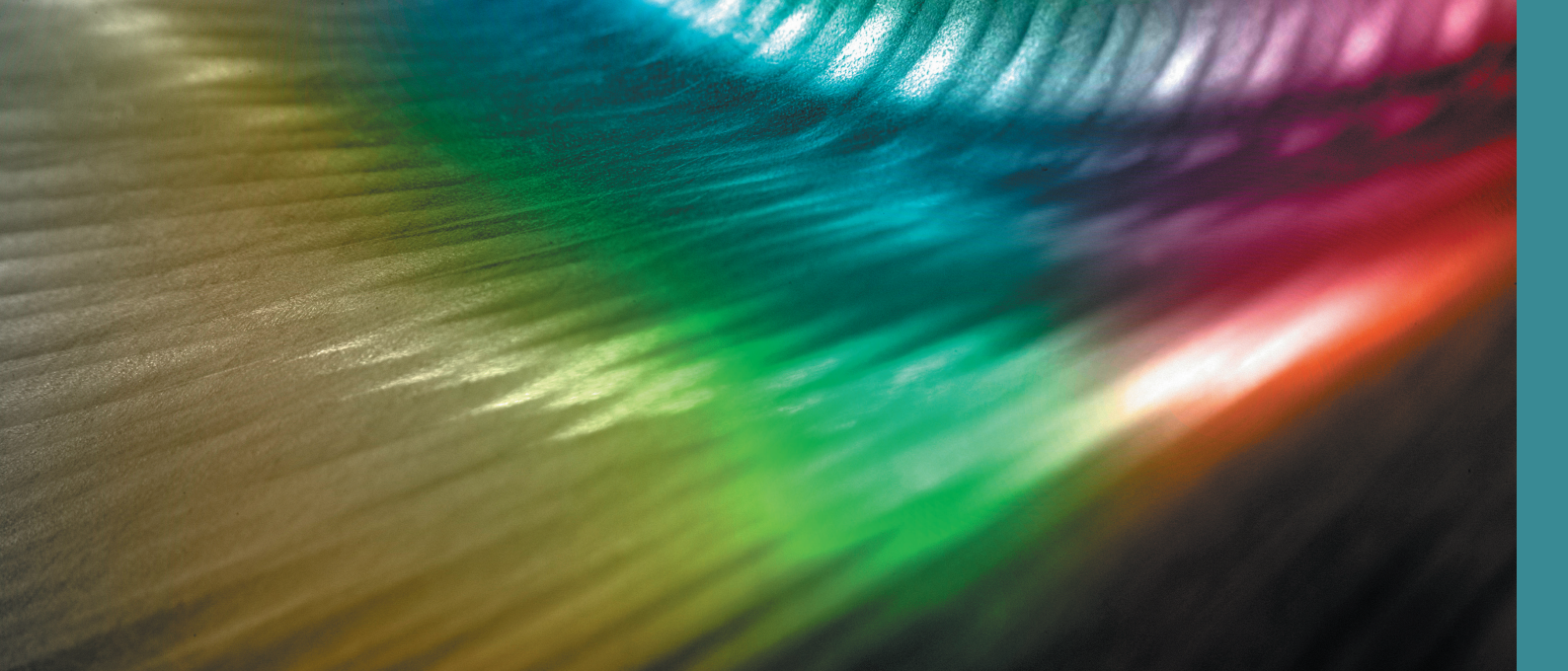
Industrial information and automation

Duncan McFarlane, Mark Harrison, Tariq Masood and Phil Woodall,
Lecture Room 2

Manufacturing footprint strategy

Paul Christodoulou and Don Fleet, Seminar Room 3

13:00 LUNCH



14.00 SESSION 3 – PARALLEL

Three parallel sessions – please select one

Bit-by-bit – capturing value from the digital fabrication revolution

Tim Minshall, Letizia Mortara and Simon Ford, Lecture Room 1

Designing disruption

James Moultrie, Lecture Room 2

Industrial inkjet technology

Ian Hutchings and Graham Martin, Seminar Room 3

15:00 REFRESHMENTS

15.15 SESSION 4 – PARALLEL

Three parallel sessions – please select one

Technology and innovation management: collaborative opportunities

Dayo Abinusawa, Letizia Mortara, Rob Phaal, David Probert, Quan Zhou,
Lecture Room 1

Making and sustaining the shift to services

Veronica Martinez, Lecture Room 2

How sustainability can drive your business and improve your bottom line

Steve Evans, Seminar Room 3

16:15 MEET THE IfM TEAM

17:00 CLOSE

WELCOME

WHAT'S NEW AT IfM

Mike Gregory

09:45

Lecture Room 1

Mike Gregory will highlight new developments at the IfM in research, education and engagement with industry.

SESSION 1 PLENARY

THE FUTURE OF MANUFACTURING

10.00 | Dai Morgan

Involving some 300 industry and academic experts, business leaders and stakeholders, from 25 countries, the Future of Manufacturing looked at the long-term picture for the UK manufacturing sector up to 2050, investigating global trends and drivers of change. It explored how the UK could maximise these opportunities and developed an evidence base to help policy-makers prepare for the challenges ahead.

Organised by the Government Office of Science Foresight division, members of both the IfM and EPSRC Centre were involved in the steering group and in providing evidence. This talk by Dai Morgan will highlight some of the key challenges and opportunities arising from the evidence and analysis.

UK HIGH VALUE MANUFACTURING LANDSCAPE

10.20 | Andrew Gill

The UK is a major competitor in the £6.5 trillion global manufacturing economy. High value manufacturing (HVM) – the application of leading-edge technical knowledge and expertise to the creation of products, production processes and associated services – has the potential to bring sustainable growth and major economic benefits to the UK. Andrew Gill will outline the continuing developments since the 2011 study and IfM's work with TSB and the HVM Catapult to set out to understand the global manufacturing context in which UK companies must compete and how that context is expected to evolve over the next 15–20 years.

SCIENCE, TECHNOLOGY AND INNOVATION POLICY

10.40 | Eoin O'Sullivan

Dr Eoin O'Sullivan will introduce the Centre for Science, Technology & Innovation Policy (CSTI), including its ongoing research activities related to the 'Future of Manufacturing'. CSTI carries out applied research into policies and government programmes for translating science and engineering research into new technologies, industries and economic wealth. Research projects are designed to support the evidence needs of policymakers and research agency officials who are responsible for programme design, portfolio management and strategy development. A key focus of CSTI's research agenda is the interdependence of manufacturing and innovation, and the implications for national industrial sector strategies and technology policy.

CAPTURING VALUE FROM GLOBAL NETWORKS

11.00 | Jag Srai

The IfM's Centre for International Manufacturing (CIM) pursues an extensive programme of research and real-world application of new approaches for the strategic configuration of global value networks, working closely with a community of industrialists, policymakers and academics. Jag Srai will introduce a new report from the centre 'Capturing Value from Global Networks' setting out how these new methodologies have supported transformations in leading industries, and introducing an integrated model to production, supply and service network design.

DEVELOPING MANUFACTURING TALENT

11.20 | Judith Shawcross

Judith Shawcross will describe the complete range of IfM's educational activities:

- developing the next generation of manufacturing leaders through our undergraduate and postgraduate taught and research-based courses.
- transferring our knowledge to industry through a wide range of open and bespoke education programmes.
- carrying out research into how individuals acquire the skills and knowledge to become effective practitioners and how companies develop the capabilities they need to compete in the industrial ecosystem.

SESSION 2

PARALLEL : PLEASE SELECT

ROADMAPPING FOR STRATEGY AND INNOVATION

Rob Phaal and Jim Trueman

12:00

Lecture Room 1

This session will focus on roadmapping, a widely used technique for supporting innovation, strategy and transformation programmes. It uses a structured visual approach as a basis for aligning and communicating strategy. Significant features of roadmapping are its breadth and versatility: roadmaps can encompass a very broad scope of issues and long time-frames whilst also focusing on critical details.

Each roadmap comprises a chart on which information is captured about the different functions and perspectives of an organisation against an agreed timeline. In a company, for example, these might be markets, products, technologies and resources. The roadmap provides a structure to explore and prioritise issues and develop strategies and implementation plans. By involving all the key stakeholders it helps build consensus across the organisation.

The visual format cuts through complexity, highlighting links, gaps, opportunities and potential problems, providing a framework to answer the questions, 'Where are we now?', 'Where do we want to go?' and 'How can we get there?' Applications range from business strategy development and product planning to research prioritisation and policy formulation. Roadmapping integrates easily with other management techniques such as portfolio methods, scenario planning and product development stage gate processes.

Cambridge roadmapping approach

The Institute for Manufacturing is actively involved in both research and practice, with more than 250 roadmapping applications in a diverse range of sectors and contexts since 1998. Specialised workshop techniques have been developed to support roadmapping at both firm and sector levels. A collaborative approach ensures that the approach can be adapted to suit the particular context, supporting rapid initiation and transfer of the technique.

Practitioners have worked with governments, multi-national companies and public sector organisations including: ABB, Airbus, AkzoNobel, Astra Zenica, Astrium, BAE Systems, BASF, BOC-Linde, BP, BT, Caterpillar, Crown Packaging, Cryovac, Domino Printing Sciences, DSTL, ESAB, Eurotherm, GE Healthcare, General Mills, GKN, Grundfos, GSK, Henkel, Huntsman, Ineos, Malvern Instruments, Mars, Microsoft, Proton, Rexam, Rolls-Royce, Royal Mail, Schlumberger, Siemens, Sulzer, and the UK Department of Transport, Knowledge Transfer Networks, Ministry of Defence and Technology Strategy Board.

This session will provide a brief introduction to the roadmapping approach, followed by a series of case studies that illustrate the power, flexibility and efficiency of the approach, together with a summary of current research in this area. There will be time to ask questions and discuss the advantages and challenges of roadmapping, and to explore opportunities to engage with IfM in terms of both research and practice.

INDUSTRIAL INNOVATION AND AUTOMATION

Duncan McFarlane, Mark Harrison, Tariq Masood and Phil Woodall

12:00

Lecture Room 2

Professor Duncan McFarlane will introduce the Distributed Information and Automation Laboratory (DIAL) which is concerned with helping companies:

- exploit the key enabling technology of RFID
- integrate automatic identification (Auto-ID) into existing business systems
- develop distributed automated solutions for manufacturing and logistics
- apply smart technologies to service and support
- futureproof by assessing industrial responsiveness
- quantify the value of improved information for better decision making
- reconfigure supply networks and industrial systems
- improve whole-life management of industrial assets

Following this overview:

Dr Mark Harrison will discuss DIAL research into using identification technologies to tag components and products so they can be tracked throughout the supply chain anywhere in the world.

Dr Tariq Masood will discuss how DIAL are developing tools and methodologies to improve through-life management of infrastructure assets.

Dr Phil Woodall will introduce a collaborative programme with Boeing on Intelligent Data management and talk more broadly about the opportunities in data analysis.

MANUFACTURING FOOTPRINT STRATEGY

Paul Christodoulou and Don Fleet

12:00

Seminar Room 3

The IfM has undertaken many years of research into manufacturing footprint strategy – understanding how to establish the best configuration of plants around the globe. The resulting approaches have been applied in a series of major collaborations with multinational companies, in a wide range of industrial sectors and strategic contexts. This session provides an overview of the toolkit - illustrated with recent applications – and describes how the companies have embedded the approach within their strategy processes driving significant business benefits.

SESSION 3

PARALLEL : PLEASE SELECT

BIT-BY-BIT – CAPTURING VALUE FROM THE DIGITAL FABRICATION REVOLUTION

Tim Minshall, Letizia Mortara and Simon Ford

14:00

Lecture Room 1

Dr Tim Minshall and Dr Letizia Mortara will introduce a current area programme of RCUK-funded research that examines the reality and potential of digital fabrication for the UK economy.

More popularly known as '3D printing' and also termed 'additive manufacturing', digital fabrication covers a broad range of technologies that offer the prospect of on-demand mass personalisation, with more localised, flexible and sustainable production. The emergence of 3D printing technologies is leading many manufacturers to question how they produce their goods; 3D printing has the potential to disrupt the organisation of manufacturing and the ways in which incumbent companies and new entrants create and capture value.

Will it bring about a 'manufacturing revolution', as many commentators are claiming? To answer this question, the Bit by Bit project is exploring the impact of 3D printing technologies through three phases of research:

1. Emergence: How did 3D printing emerge? What trends, patterns, barriers and enablers can be seen in the emergence and diffusion of 3D printing?
2. Business model disruptions: How is value now being captured from 3D printing technologies? How has value capture changed? What traditional/disruptive business models have they enabled?
3. Scenarios: What future scenarios may result from the diffusion of 3D printing technologies? What are the possible associated business models, and the barriers and enablers to adoption?

This session will provide an overview of this project. Discussions will centre on the progress made in the first phase of the project, which is investigating the emergence and evolution of the 3D printing industry and the adoption of these technologies in established industries. The session will conclude by highlighting opportunities for future engagement for those interested in this subject.

DESIGNING DISRUPTION

James Moultrie

14:00

Lecture Room 2

Dr James Moultrie will discuss Design Management Group activities which are focused on understanding and improving the ways in which design and new product development are managed.

The Design Management Group is interested in how design can be effectively managed to create sustainable, desirable, usable and producible new products and services. Central to this aim is the role of design as an integrator between technology and users. We are also active in understanding, valuing and promoting the importance of design at firm and national levels.

Key research interests include:

- Valuing the benefits of design
- Integrating design and technology
- How to design sustainable products and services
- New ways of managing product development
- Using design as a strategic resource

INDUSTRIAL INKJET TECHNOLOGY

Ian Hutchings and Graham Martin

14:00

Seminar Room 3

The Inkjet Research Centre (IRC) was established within the IfM in 2005. Its research underpins the rapidly developing technology of inkjet printing. We currently lead a major EPSRC programme involving collaboration with other Cambridge departments as well as the Universities of Durham and Leeds. In this and other recent projects we have been involved in active collaboration with twelve companies and eight other research centres. Research topics in the IRC range from fundamental studies of the behaviour of liquid jets and drops, to applications of inkjet printing in a manufacturing context.

In this session we will show some examples of recent work, including:

- answers to basic questions about the stability of liquid jets
- effects of polymers on inkjet behaviour
- high-speed holography for ultra-precise measurements
- a new method for generating liquid drops
- drop impact and coalescence on surfaces
- application of inkjet printing to medical diagnostic device manufacture
- printable liquid crystal lasers
- printing of mammalian cells

In the IRC we use our expertise in inkjet technology, fluid mechanics, complex rheology, high-speed visualisation, analysis and computation to study jet and drop creation, drop flight and drop/surface interactions. We are also very interested in the application of inkjet processes to manufacturing, including the printing of functional and biological materials. We are always keen to discuss opportunities for research and collaboration with new partners.

After the session there will be a brief opportunity for a limited number of attendees to visit the laboratories in small groups with IRC researchers.

SESSION 4

PARALLEL : PLEASE SELECT

TECHNOLOGY & INNOVATION MANAGEMENT: COLLABORATIVE OPPORTUNITIES

Dayo Abinusawa, Letizia Mortara, Rob Phaal, David Probert, Quan Zhou

15.15, Lecture Room 1

Technologies lie at the heart of any manufacturing company – whether used in the manufacturing process or forming an integral part of the products themselves. Successfully assimilating existing technologies into the business and anticipating the impact of emerging new technologies are critically important tasks for companies under pressure to bring new products to market as quickly as possible. Close collaboration with industrial partners is a characteristic of our research at the Centre for Technology Management (CTM), and this session reviews some current opportunities to get involved. These include:

The strategic use of corporate venture capital to support ambidexterity – balancing the development of ‘the business as usual’ with more radical departures into new business areas poses challenges for project selection methods and capital resources. Corporate venture capital initiatives may be one way of addressing this challenge.

The Strategic Technology and Innovation Management (STIM) consortium is a practice-oriented research and networking collaboration between industrial member companies and CTM. This is an annual programme, now in its second year, focused around a portfolio of research projects and a series of network and research engagement days, bringing together companies from diverse sectors. The STIM consortium model for industry-university collaboration will be described, together with an overview of the 2014 research portfolio, covering two projects in detail:

- **How is technology intelligence assimilated into decision making?** – This project focuses on the progression of decision makers’ awareness of emerging technologies, to identify how emerging technologies move up in importance in firm strategy. Understanding the perceptions and needs of decision-makers will help to develop more effective ways of delivering insightful and impactful intelligence.
- **Issues for R&D location with a focus on China**
China has been one of the preferred destinations for companies looking to leverage its labour dividend and fast growing domestic market. However, is China a suitable location for conducting R&D activities? The aim of this project is to develop a checklist of important issues that a company must consider before locating its R&D activities to China.

MAKING AND SUSTAINING THE SHIFT TO SERVICES

Veronica Martinez

15.15

Lecture Room 2

Dr Veronica Martinez will introduce the preliminary results of Making and Sustaining the Shift to Services, one of the main projects of the Cambridge Service Alliance.

The Cambridge Service Alliance is a unique academic-corporate partnership between Caterpillar, BAE Systems, IBM, Pearson and the University of Cambridge to research new ways to provide, implement and employ complex service systems.

The ability to “understand the shift to services” is increasingly important for organisations in assessing their longer-term competitive strategies if they are to succeed in the market. The Cambridge Service Alliance’s partners and other organisations recognise the importance of understanding the logic behind the adoption of service provision, the type of service offerings, the destination journeys and interrelated processes involved in the service provision. This project aims to develop a strategic understanding of the shifting to services and answer the question: how do you effect a successful shift to services? Dr Martinez will present the preliminary findings from a pilot study carried out with three multinational organisations making the shift to services.

HOW SUSTAINABILITY CAN DRIVE YOUR BUSINESS AND IMPROVE YOUR BOTTOM LINE

Steve Evans

15.15

Seminar Room 3

At the Centre for Industrial Sustainability, we aim to develop knowledge and tools that help accelerate the transition towards a sustainable industrial system. We help manufacturers take sensible action now, whilst understanding the long-term opportunities for capturing value. Steve Evans will introduce the work of the Centre for Industrial Sustainability, highlighting the opportunities available to manufacturers today to improve the bottom line whilst delivering environmental performance improvements.

An interactive session, Steve will encourage the audience to explore and debate of the range of challenges facing manufacturers. How far their sector can go on resource efficiency? What is needed to make that happen? What technologies will be impacting your business in the next decade? How might your business model change over the next 10 years?

Steve will also introduce the EPSRC Centre for Innovative Manufacturing in Industrial Sustainability, which works closely with leading companies of all sizes and sectors that are actively preparing for this challenge. The EPSRC Centre brings together leaders in the field to create a national centre of excellence for the UK. It focuses primarily on two fronts: rapidly reducing the resource and energy intensity in the production of existing goods and simultaneously investigating options for a radical redesign of the industrial system.

INSTITUTE FOR MANUFACTURING (IfM)

The IfM is part of the University of Cambridge. It brings together expertise in management, technology and policy to address the full spectrum of issues which can help industry and governments create sustainable economic growth.

Management: covering a wide range of topics including the development of sustainable industrial practice, capturing value from innovation, optimising global operations networks and moving from product to service-based models. The IfM is an international centre of excellence for roadmapping, a powerful technique for aligning technology and business objectives.

Technology: inkjet and laser-based manufacturing process technologies, carbon nanomaterials, advanced information systems and automated identification technologies, all with a wide range of industrial applications.

Policy: programmes, processes and practices for translating publicly-funded R&D (in particular science and engineering research) into new technologies, industries and economic wealth.

In each of these areas of expertise, the IfM carries out:

Research: bringing together specialists in management, technology and policy to provide a unique perspective on the challenges facing manufacturers of all sizes, from start-ups to multinationals.

Education: giving the next generation of manufacturing leaders a thorough grounding in management and manufacturing technology, based on real industrial experience.

Practice: applying IfM research to help organisations achieve their strategic goals. Findings from these projects directly inform future research.