Engineering Tripos Part IIB, 4E3: Business Innovation in a Digital Age, 2023-24

Module Leader

Karla Sayegh [1]

Timing and Structure

Michaelmas term. Assessment: Coursework / 1 Individual Paper 100%

Aims

The aims of the course are to:

- Analyse the approaches, challenges and trade-offs involved in developing and implementing digital innovation
- Examine how digital technologies such as platforms, artificial intelligence (AI) and big data are transforming work and organizations.

Objectives

As specific objectives, by the end of the course students should be able to:

- understand the distinctive characteristics of digital technologies
- explain how digital platforms have changed strategic thinking, firm economics and business models
- analyse how different types of organizations can create, navigate and leverage ecosystems for innovation
- explain the benefits and challenges of open innovation in established firms
- explain the mechanisms and challenges of knowledge collaboration for innovation
- evaluate the potential of data and algorithms in transforming knowledge work
- understand the planned and unintended consequences of digital technologies in organizations
- think critically about the organisational and societal challenges triggered by the emergence of new technologies

Content

Now more than ever, emerging digital technologies, such as robotics, cloud computing, quantum computing, digital platforms and sophisticated learning algorithms that exploit massive trace data, are enabling innovation in unprecedented ways. Digital innovation has not only transformed products and services but has also upended business models, ways of working, forms of organizing and the ability to access ideas and expertise. However, digitally-enabled innovation is challenging because organizations may need to shift away from the very capabilities that underpinned their past successes. In the digital era, managers and professionals need to think differently about fundamental aspects of their business such as its strategy and associated business models, marketing approaches, organizational structures and incentives, cultures and the coordination of expertise.

In this module, you will learn about digital platforms and ecosystems, artificial intelligence (AI), open innovation and knowledge integration and how they have transformed strategy-making, decision-making, business models, collaboration, expertise, work and organizing. You will also analyse the challenges and trade-offs involved in developing, implementing and scaling digital transformation initiatives. Finally, you will apply key concepts and analytical tools to real world business problems through interactive discussions of case studies.

MODULE OUTLINE

Session 1: Introduction to innovation in a digital age

Session 2: Platforms and ecosystems – part 1

Session 3: Platforms and ecosystems – part 2

Session 4: Algorithms and work

Session 5: Open innovation

Session 6: Knowledge collaboration for innovation

Session 7: Technology and the changing nature of work

Session 8: Student presentations and peer-reviews

Please note that all sessions will be highly interactive and discussion-based. In every session, we will sense-make about real business problems via case studies both collectively and in small groups. Therefore, you are expected to come to class having prepared the assigned case study for that session.

MODULE OUTLINE

Session 1: Introduction to innovation in a digital age

- Understanding what innovation means

- Identifying the distinctive characteristics of digital technologies

- Introduction to the course, what to expect and how we will work

Pre-reading		
Garud, R., Tuertscher, P., & Van de Ven, A. H. (2013).	Perspectives on innovation processes. *The Academy of Management Annals*, *7*(1), 775-819.	
Yoo, Y. et al. (2012)	"Organizing for Innovation in the Digitized World." Organization Science, 23(5): pp. 1398-1408.	

Supplemental reading		
Christensen, C.M et al. (2015)	"What Is Disruptive Innovation?" *Harvard Business Review.* 2-11.	
Christensen, C.M et al. (2013)	Christensen, Clayton M. *The innovator's dilemma: when new technologies cause great firms to fail*. Harvard Business Review Press, 2013. Chapter 11.	

Session 2: Digital innovation: Platforms and ecosystems

- The new logic of platforms: strategy, structure, business models

- How to launch and scale platforms

- Leveraging ecosystems

Pre-reading		
Van Alstyne, M., Parker, G., and Choudhary, S. (2016)	"Pipelines, platforms, and the new rules of strategy." *Harvard Business Review.*	
Jacobides, M. (2019)	"In the platform economy, what's your strategy?" *Harvard Business Review.*	

Case Study		
Markovich, S., Meagher,E. (2015)	"OurCrowd: Growing a Crowdfunding Platform in a VC World." *Harvard Business Publishing.*	

Supplemental reading		
Cusumano, M. A., Yoffie, D. B., and Gawer, A. (2020)	"The Future of Platforms." *MIT Sloan Management Review*, 61(3): pp. 46-54	
McGrath, R. and McManus, R. (2020)	"Discovery-Driven Digital Transformation: Learning Your Way to a New Business Model" *Harvard Business Review*. 98(3): pp. 124-133	

Session 3: Platforms and ecosystems (cont'd)

- How to launch a platform

- How to grow and scale a platform

- The importance of context

Pre-reading		
Wu, A., Clough, D, and Kaletsky, S. (2019)	"Nascent Platform Strategy: Overcoming the Chicken-or-Egg Dilemma." *Harvard Business Review.*	
Hagiu, A. (2014)	"Strategic decisions for multi-sided platforms." *MIT Sloan Management Review*	
Zhu, F. and Iansiti, M.	"Why Some Platforms Thrive and Others Don't" *Harvard Business Review*	

Case Study		
Jelassi, T., Kordy, A., Ode, H., Podkolzine, R., and Vamala, S. (2018)	"Nestle: Developing a Digital Nutrition Platform For Japan." *Harvard Business Publishing*.	

Supplemental reading		
Yoffie, D. B., Gawer, A., & Cusumano, M. A. (2019)	"A study of more than 250 platforms a reveal why most fail." *Harvard Business Review*.	
Cennamo, C. and Sekol, D (2021)	"Can the EU Regulate Platforms Without Stifling Innovation?" *Harvard Business Publishing.*	

Session 4: Data and Algorithms

- Big data and business intelligence

- Ethical issues of algorithmic and data-driven ways of working

- Digital transformation with AI

Pre-reading		
Faraj, S., Pachidi, S., & Sayegh, K. (2018)	"Working and organizing in the age of the learning algorithm." *Information and Organization*, 28(1): pp. 62-70	
Foutaine, T., McCarthy, B.,& Saleh, T. (2019)	"Building the AI-powered Organziation: Technology isn't the biggest challenge; Culture Is." *Harvard Business Review.*	
Case study		
Greenstein, S. & Gulick, S.	"Zebra Medical Vision." *Harvard Business Publishing*.	

Supplemental reading		
Lebovitz, S, Levina, N., Lifshitz-Assaf, H., (2021)	"Is AI ground truth really true?" *MISQ*, 45(3): pp. 1501-1525	
Mohlmann, M. and Henfridsson, O. (2019)	"What people hate about being managed by algorithms" *Harvard Business Publishing.*	
Joshi, M., Su, N., Austin, R. (2021)	"Why so many data science projects fail to deliver" *MIT Sloan Management Review.*	

Session 5: Open innovation

- What is open innovation (OI)

- How to design and execute an OI initiative – OI as digital transformation

- Challenges to open collaboration

Pre-reading		
Boudreau, K. J., & Lakhani, K. R. (2013).	"Using the Crowd as an Innovation Partner." *Harvard Business Review*," 91(4), 60-69.	

King, A., & Lakhani, K. R. (2013).	"Using open innovation to identify the best ideas. *MIT Sloan Management Review*," 55(1), 41	
Lifshitz-Assaf, H., Tushman, M., & Lakhani, K. R. (2018)	"A study of NASA scientists shows how to overcome barriers to open innovation." *Harvard Business Review*.	
Case study		
Lakhani, K. Hutter, K., Pokrywa, H.S., Füller, J.	Open Innovation at Siemens. *Harvard Business Publishing.* 613100-PDF-ENG	

Session 6: Knowledge collaboration for Innovation

- The role of knowledge in innovation

- Producing novel products, services and processes across knowledge boundaries

- Cross-functional teams and complex collaboration

Pre-reading		
Carlile, P. (2004)	"Transferring, Translating, and Transforming: An Integrative Framework for Managing Knowledge Across Boundaries" *Organization Science*.	
Faraj, S., Sayegh, K., and Rouleau, L. (2018)	"Knowledge collaboration in organizations: from information processing to social knowing." In: Galliers, R.D. and Stein, M.K. (eds.) The Routledge companion to management information systems. London: Taylor and Francis, pp.370-386.	
Case Study		
Garvin, D. and Taahilyani, R. (2011)	"Mindtree: A community of communities." *Harvard Business Publishing.*	

Session 7: Digital innovation and the changing nature of work and organising

- Technology enabling new ways of working and organizing

- Collaborating with technology

- Organizational and cultural barriers and enablers to digital innovation

Required reading		
Faraj, S., Renno, W., & Bhardwaj, A. (2021).	"Unto the breach: What the COVID-19 pandemic exposes about digitalization." *Information and Organization,* 31(1).	
Bailey, D. E., & Barley, S. R.	"Beyond design and use: How scholars should study intelligent	

(2020).	technologies." *Information and Organization* 30(2).	
Pisano, G. (2019)	"The Hard Truth About Innovative Cultures." *Harvard Business Review*.	
Case study		
Pachidi, S., Berends, H., Faraj, S., & Huysman, M. (2021).	Make way for the algorithms: Symbolic actions and change in a regime of knowing. Organization Science, 32(1), 18-41.	

Session 8: Student presentations

Learning points of the session:

- Practice presentation skills

- Receive feedback on individual paper

- Practice reviewing skills

Preparation before the session:

Prepare the slides of your presentation (10 min) and practise.

Send your slides to the lecturer and to your reviewer in advance

Read the slides of your classmate and prepare feedback (max 5 min).

During the session:

You will present the main ideas of your paper to the class.

You will receive feedback from the lecturer and a classmate.

You will provide feedback to each other on how each paper can be further developed.

Further notes

REQUIRED READING

All students are required to read a number of articles (~3-4) before each session. There are three types of readings:

- Academic journal articles. Articles in peer-reviewed academic journals focused on producing novel theoretical contributions to the field of organisational studies and information systems.

- Practitioner articles. Based on research, these articles focus on the implications of theory for the practice of management. They often provide actionable guidance regarding salient organisational issues or problems.

- (Teaching) Case studies are analytical narratives of real-world business problems/challenges/dilemmas facing a protagonist in an organization. They are designed to offer valuable, contextualized application of concepts and analytical tools. Learning is achieved through collective in-class discussion based on analysis, data-driven argumentation and creative exchanges. Cases provide the context for problem framing, external/internal analysis and well-argued solutions. They also allow for concepts and frameworks to be applied in order to arrive at well-reasoned recommendations.

Coursework

COURSEWORK

The 4E3 module will be assessed by the following means:

- **Written paper, individual** (100% of total mark). This component of the assessment is made up of a final term paper.

Coursework	Format	Due date
Final term paper The individual paper assignment will include a 2,500-3,000 word paper on an agreed upon topic. Students will investigate and report on how digital technology is driving innovation and change in a particular industry or domain of the student's choosing (e.g. digital goods in the entertainment sector, mobile applications in banking or heathcare etc.). Students are expected to apply the concepts discussed in class and where appropriate, explicitly draw on the articles provided in the module as well as other relevant articles from their own research. The written submission needs to be grounded in the appropriate literature on the topic. Please, make sure that your work is carefully referenced in accordance with the Harvard system. (http://www.blogs.jbs.cam.ac.uk/infolib/2013/10/04/advice-on-plagiarism-a... [2]). Learning objectives: • Deepen understandings of the concepts, frameworks and/or tools on digital innovation. • Apply approaches and lessons learned from the class to a specific phenomenon. • Improve analytical and writing skills.	Individual Report anonymously marked	TBA (via [60/60]

Examination Guidelines

Please refer to Form & conduct of the examinations [3].

UK-SPEC

This syllabus contributes to the following areas of the UK-SPEC [4] standard:

Toggle display of UK-SPEC areas.

GT1

Develop transferable skills that will be of value in a wide range of situations. These are exemplified by the Qualifications and Curriculum Authority Higher Level Key Skills and include problem solving, communication, and working with others, as well as the effective use of general IT facilities and information retrieval skills. They also include planning self-learning and improving performance, as the foundation for lifelong learning/CPD.

IA1

Apply appropriate quantitative science and engineering tools to the analysis of problems.

IA2

Demonstrate creative and innovative ability in the synthesis of solutions and in formulating designs.

KU1

Demonstrate knowledge and understanding of essential facts, concepts, theories and principles of their engineering discipline, and its underpinning science and mathematics.

KU2

Have an appreciation of the wider multidisciplinary engineering context and its underlying principles.

S1

The ability to make general evaluations of commercial risks through some understanding of the basis of such risks.

P3

Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, technology, development, etc).

US4

An awareness of developing technologies related to own specialisation.

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