

## **Engineering Tripos Part IIB, 4E3: Business Innovation in a Digital Age, 2021-22**

### **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
- evaluate the potential of data and algorithms in transforming knowledge work
- explain the mechanisms and challenges of knowledge collaboration for innovation
- explain the benefits and challenges of open innovation in established firms
- 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**

Today, household names such as Apple, Alphabet (Google), Facebook and Amazon continue to outperform their competitors and dominate markets. A core reason: digital innovation. Now more than ever, emerging digital technologies, such as robotics, cloud computing, web-enabled platforms and sophisticated learning algorithms that exploit massive digital 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 beyond organizational boundaries. 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, culture change, the coordination of expertise and organisational structure.

In this module, you will analyse the approaches, challenges and trade-offs involved in developing and implementing digital innovation. You will also examine how digital technologies such as digital platforms, artificial intelligence (AI) and big data are transforming work and organizations. You will learn by analysing real-world problems and situations across a range of organizations and industries through case studies. Class time will be

devoted primarily to applying key concepts and analytical tools via case discussions.

**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

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

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

**Session 2: Digital innovation: Platforms and ecosystems**

- Understanding the new logic platforms: strategy, structure, business models
- Platform strategy – how to launch a platform
- Leveraging ecosystems

| <b>Pre-reading</b>                                    |   |  |
|---|---|--|
| Van Alstyne, M., Parker, G., and Choudhary, S. (2016) | "Pipelines, platforms, and the new rules of strategy." <i>Harvard Business Review</i> .   |  |
| Cusumano, M., Yofie, D., and Gawer, A. (2020)         | 'The Future of Platforms'. Special Issue on Disruption 2020, MIT Sloan Management Review, Spring 2020, Vol. 61, No. 3, pp. 46-54. |  |

| <b>Case Study</b>                 |   |  |
|-----------------------------------|---|--|
| Markovich, S., Meagher, E. (2015) | "OurCrowd: Growing a Crowdfunding Platform in a VC World." <i>Harvard Business Publishing</i> . |  |

| <b>Supplemental reading</b>        |   |  |
|------------------------------------|---|--|
| Jacobides, M. (2019)               | "In the platform economy, what's your strategy?" <i>Harvard Business Review</i> .                                     |  |
| McGrath, R. and McManus, R. (2020) | "Discovery-driven Digital Transformation: Learning your way to a new business model" <i>Harvard Business Review</i> . |  |

**Session 3: Platforms and ecosystems (cont'd)**

- How to launch a platform
- How to grow and scale a platform
- The importance of context

| <b>Pre-reading</b>                         |  |  |
|--|--|--|
| Wu, A., Clough, D, and Kaletsky, S. (2019) | "Nascent Platform Strategy: Overcoming the Chicken-or-Egg Dilemma." <i>Harvard Business Review</i> . |  |
| Zhu, F. and Iansiti, M.                    | "Why Some Platforms Thrive and Others Don't" <i>Harvard Business Review</i>                          |  |

| <b>Case Study</b>  |   |  |
|--|---|--|
| Jelassi, T., Kordy, A., Ode, H., Podkolzine, R., and Vamala, S. (2018) | "Nestle: Developing a Digital Nutrition Platform For Japan." <i>Harvard Business Publishing</i> . |  |

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| <b>Supplemental reading</b>                        |   |  |
| Yoffie, D. B., Gawer, A., & Cusumano, M. A. (2019) | "A study of more than 250 platforms a reveal why most fail." <i>Harvard Business Review</i> . |  |

**Session 4: Data and Algorithms**

- Big data and business intelligence
- Ethical issues of algorithmic and data-driven ways of working
- AI and organizations: decision making, power and control

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

**Session 5: Open innovation**

- What is open innovation
- Crowdsourcing
- Challenges to open collaboration

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|--|--|--|
| <b>Pre-reading</b>                                       |  |  |
| Boudreau, K. J., & Lakhani, K. R. (2013).                | "Using the Crowd as an Innovation Partner." <i>Harvard Business Review</i> ," 91(4), 60-69.                      |  |
| King, A., & Lakhani, K. R. (2013).                       | "Using open innovation to identify the best ideas. <i>MIT Sloan Management Review</i> ," 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." <i>Harvard Business Review</i> . |  |
| <b>Case study</b>  |  |  |
| Lakhani, K. Hutter, K., Pokrywa, H.S., Füller, J.        | Open Innovation at Siemens. <i>Harvard Business Publishing</i> . 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

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|---|---|--|
| <b>Pre-reading</b>                            |   |  |
| Carlile, P. (2004)                            | "Transferring, Translating, and Transforming: An Integrative Framework for Managing Knowledge Across Boundaries"<br><i>Organization Science</i> .   |  |
| 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.) <i>The Routledge companion to management information systems</i> . London: Taylor and Francis, pp.370-386. |  |
| <b>Case Study</b>                             |   |  |
| Garvin, D. and Taahilyani, R. (2011)          | "Mindtree: A community of communities." <i>Harvard Business Publishing</i> .  |  |

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

- Technology bringing about new ways of working and organizing
- Collaborating with technology
- Organizational and cultural barriers and enablers to digital innovation

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|--|--|--|
| <b>Required reading</b>                                    |  |  |
| Faraj, S., Renno, W., & Bhardwaj, A. (2021).               | "Unto the breach: What the COVID-19 pandemic exposes about digitalization." <i>Information and Organization</i> , 31(1).     |  |
| Bailey, D. E., & Barley, S. R. (2020).                     | "Beyond design and use: How scholars should study intelligent technologies." <i>Information and Organization</i> 30(2).      |  |
| Pisano, G. (2019)  | "The Hard Truth About Innovative Cultures." <i>Harvard Business Review</i> .   |  |
| <b>Case study</b>  |  |  |
| Pachidi, S., Berends, H., Faraj, S., & Huysman, M. (2021). | Make way for the algorithms: Symbolic actions and change in a regime of knowing. <i>Organization Science</i> , 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 by Monday November 30 at 500pm.

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                       |
|--|---|--------------------------------|
| <p><b>Final term paper</b></p> <p>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, 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.<br/> <a href="http://www.blogs.jbs.cam.ac.uk/infolib/2013/10/04/advice-on-plagiarism-a...">http://www.blogs.jbs.cam.ac.uk/infolib/2013/10/04/advice-on-plagiarism-a...</a> [2].</p> <p><u>Learning objectives:</u></p> <ul style="list-style-type: none"> <li>• Deepen understandings of the concepts, frameworks and/or tools on digital innovation.</li> <li>• Apply approaches and lessons learned from the class to a specific phenomenon.</li> <li>• Improve analytical and writing skills.</li> </ul> | <p>Individual</p> <p>Report</p> <p>anonymously marked</p> | <p>TBA (via</p> <p>[60/60]</p> |

## 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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**Links**

[1] <mailto:k.sayegh@jbs.cam.ac.uk>

[2] <http://www.blogs.jbs.cam.ac.uk/infolib/2013/10/04/advice-on-plagiarism-all-you-need-to-know-in-one-place/>

[3] <https://teaching24-25.eng.cam.ac.uk/content/form-conduct-examinations>

[4] <https://teaching24-25.eng.cam.ac.uk/content/uk-spec>