



MANAGEMENT 731: TECHNOLOGY STRATEGY (WEMBA EAST)*
Fall 2019

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COURSE DESCRIPTION

The course is designed to meet the needs of managers, entrepreneurs, consultants and investors who must analyze and develop business strategies in technology-based industries. The emphasis is on learning conceptual models and frameworks to help navigate the complexity and dynamism in such industries. This is not a course in new product development or in using information technology to improve business processes and offerings. We will take a perspective of both established and emerging firms competing through technological innovations, and study the key strategic drivers of value creation and appropriation in the context of business ecosystems. Such a perspective will help answer the following questions:

- What are the models of industry, technology, and market evolution, and what are the implications for strategy?
- Why do established firms struggle to compete in a changing technology landscape, and what can they do to increase the odds of success?
- How can start-ups disrupt mature industries?
- How to create value in a platform-based ecosystem, and manage the shift from a product focused to a platform focused strategy?
- What are the different types of business models that firms can use to innovate and appropriate value from their technology IP, and how should firms choose which business model to use?

The course uses a combination of interactive lectures, case analyses and simulations. It draws on the rich and emerging stream of research in technology management and strategy that moves beyond “one size fits all” approach to technology firms and instead focuses on the choices that managers and entrepreneurs face in a specific strategic situation. Cases offer an opportunity to integrate and apply the technology strategy theories and frameworks in a practical way, and are drawn from a diverse range of technology-based industries. Note, however, that case discussions are mainly based on strategic (not technical) issues. Hence, a technical background is not required for fruitful participation.

EVALUATION

Individual

- Class participation (35%)
- Back Bay Battery write-up (10%) due by October 3
- Case Write-up (10%) due day before the case is discussed in class

Team

- Application project:
 - Proposal (5%) due by September 15
 - Presentation (15%) due by Oct 5
 - Final paper (25%) due by Oct 13

*Please note that this syllabus is subject to change with prior announcements.

BACK BAY BATTERY SIMULATION

Firms face many challenges and tradeoffs with respect to their technology strategies. The case of Back Bay Battery will help us engage deeply with such challenges and tradeoffs in a real business situation. You will play the role of the President at Back Bay Battery Company, a manufacturer of industrial batteries. The President's responsibility is to determine the appropriate timing and level of R&D investments between existing and new battery technologies under uncertain real-world conditions. Your decisions are of course subject to corporate-level financial constraints. You are required to play a single run of the simulation and submit the individual write-up on Canvas the evening prior to the class session. You will play another slightly modified run in teams in class. Note that each run includes making decisions over an eight-year period. The write-up is meant to capture your thinking over the course of the simulation. It should be a maximum of 1,200 words of text (12 pt. Times Roman font, single spaced, with margins no less than 1 inch), and an optional 1 page of exhibits. The write-up should address the following questions (either in a Q&A form or an essay form):

- What was the initial strategy and the logic underlying that strategy? Please be explicit about the assumptions that formed the basis for the initial strategy
- How did the strategy change over time (i.e., between the first and the eighth year), and what were the reasons for those changes?
- What were the main challenges that you faced while making decisions?
- What additional information you would have liked to have before making decisions? Please be explicit about how might that information be collected and how would it improve decision-making
- What did you take away from the simulation?

CASE WRITE-UP

To help you develop a richer perspective on the cases, you will work on an individual assignment of answering the study questions associated with one of the cases that we discuss in the class. The questions are available on Canvas course website under the specific class in which the case will be discussed. A sign-up sheet to choose the case will be provided before the first day of class. The case write-up should be a maximum of 1,200 words of text (12 pt. Times Roman font, single spaced, with margins no less than 1 inch). Additionally, you may attach 1 or 2 exhibits based on your analysis if they directly support your arguments/recommendations. The write-up is due by the evening prior to the day the case is discussed in class, and should be uploaded on Canvas. Please note that because the write-up does not have a fixed due date, it won't appear on your To-Do list on the course home page, and on the Assignments page, it is located with the other "undated assignments" between the upcoming assignments and the past assignments. The other place where you can locate it is at the bottom of the Syllabus page. Strong write-ups will develop logical arguments using information from the case.

APPLICATION PROJECT

The major assignment for the course is a team project that applies the concepts and frameworks learnt in the course to an episode of technology strategy in an industry. The project should be worked on in a team of five (preferred) or six students. In keeping with the spirit of the class, the project will examine how a specific firm chose to create and capture value from its technological innovation. I am open to studying both successes and failures. The more specific the innovation, the narrower the definition of the market, the better. For example, it is better to focus on digital imaging than printing technologies; web browsers than internet application software; pacemakers than medical devices. Some examples of past projects are uploaded on the Canvas course web site under "Files."

The topic should be well-researched, based on an extensive review of publicly-available information as well as specialized databases available through Penn Libraries. I strongly encourage you to attempt to gain access to the firm being studied to collect data and conduct interviews, since this can lead to a uniquely rich and insightful analysis.

The one-page proposal is meant to define the boundaries within which your team would work on the application project. I will provide feedback/suggestions so as to align our expectations going forward. If you are considering/undecided on two different proposals, you can include both of them and I can provide you

with a recommendation. Please write one paragraph explaining why you believe this is a suitable topic for the team project and then provide the following information:

- Brief synopsis of focal firm
- Brief synopsis of focal technological innovation
- General list of sources of data that team expects to use (for private firms, please clearly identify at least one data source)

The project presentations are meant to showcase your analysis to your classmates and to receive feedback that can be incorporated into the final paper. The presentation should last for about twelve minutes followed by five minutes for Q&A. It should provide a brief industry overview but mostly focus on your analysis, recommendations, and lessons learnt. All presentation slide decks should be uploaded on Canvas by 9am on the day of the presentation.

The final paper should be about 6,000 words (excluding references and exhibits). The paper will be evaluated on four dimensions: First, the insight offered by the analysis – does it go beyond describing what happened to shed light on the fundamental causes. Second, the quality of the analysis and how well it integrates the concepts developed in the course. Third, how relevant, useful, and well supported are the lessons and recommendations presented. Fourth, the readability of the paper and readers' access to the ideas presented.

While you are probably aware of the conventions of properly citing material and ideas, I believe a short note on the subject is worthwhile. Material reproduced verbatim should be enclosed in quotation marks, with proper attribution made to the source. Ideas and concepts even if not quoted verbatim should be attributed to the author/source, also via proper citation.

COURSE OUTLINE†

Class 1 (08/30): What is Technology Strategy? Technology Development & Commercialization

Readings: (1) Foster, R. (1986), "The S-curve: A New Forecasting Tool," Chapter 4 in *Innovation, The Attacker's Advantage*; (2) Moore, G. (1999), "High-tech Market Illusion," Chapter 1 in *Crossing the Chasm*; (3) Adner, R. and Kapoor, R. (2016), "Right Tech, Wrong Time: How to Make Sure Your Ecosystem is Ready for the Newest Technologies," *Harvard Business Review*, 94(11): 60-67.

Supplementary Reading: Adner, R. and Kapoor, R. (2010), "Value Creation in Innovation Ecosystems: How the Structure of Technological Interdependence Affects Firm Performance in New Technology Generations," *Strategic Management Journal*, 31(3): 306-333.

Class 2 (08/31): Disruption I (Established Firms)

Case: Kodak and the Digital Revolution (HBS 9-705-448)

Readings: (1) McGahan, Anita (2004), "How Industries Change," *Harvard Business Review*, 82(10): 86-94; (2) Christensen, C. M., Raynor, M., & McDonald, R. (2015). What is Disruptive Innovation?. *Harvard Business Review*, 93(12), 44-53; (3) Kapoor, R. and Klueter, T (2017), "Organizing for New Technologies," *MIT Sloan Management Review*, 58(2): 85-86; (4) Kapoor, R. and Eklund, J. (2018), "Self-Disruption Can Hurt the Companies That Need It the Most," *Harvard Business Review*

Supplementary Readings: (1) Tushman, M., Smith, W., Wood, R., Westerman, G., & O'Reilly, C. (2010), "Organizational designs & innovation streams," *Industrial and Corporate Change*, 19(5): 1331-1366; (2) John Eklund and Rahul Kapoor (2018), "Pursuing the New while Sustaining the Current: Incumbent Strategies and Firm Value during the Nascent Period of Industry Change," *Organization Science*.

Class 3 (09/20): Disruption II (Emerging Firms)

Case 1: Netflix in 2011 (HBS 9-615-007)

Case 2: Abgenix and the XenoMouse (HBS 9-501-061)

Reading: Teece, D. J. (2006). Reflections on "profiting from innovation". *Research Policy*, 35(8), 1131-1146.

Class 4 (09/21): Platforms and Ecosystems

Simulation: Two-sided Markets

Case: Apple vs. Google – (1) iPhone Unveiled, AP, Jan 9, 2007 (2) Apple vs. Google, *Businessweek*, Jan 14, 2010; (3) Android Invasion, *Newsweek*, Oct 11, 2010; (4) Steve Jobs on Q4'2010 Earnings Call, Oct 18, 2010.

Readings: (1) Van Alstyne, M.V., Parker, G. G., & Choudary, S. P. (2016). Pipelines, Platforms, and the New Rules of Strategy. *Harvard Business Review*, 94(4), 54-62.; (2) Kapoor, Rahul (2018), "Why We Might See 'Facebook Prime' in the Near Future." <http://fortune.com/2018/07/31/why-we-might-see-facebook-prime-in-the-near-future/>; (3) Kapoor, R. (2018), "Ecosystems: Broadening the Locus of Value Creation," *Journal of Organization Design*, 7(1): 12 [link](#)

† Please note that slides will be posted after each class in the canvas course web site. The case discussion questions are also available on the course website under the specific class. Finally, the syllabus includes a large number of supplementary readings. These readings, available on the course website, provide a deeper treatment and/or the latest research on a given topic. I will cover them in the class and while they are not expected to be read before the class, they may serve as useful post-class reference.

Supplementary Reading: Kapoor, R. and Agarwal, S. (2017), “Sustaining Superior Performance in Business Ecosystems: Evidence from Application Software Developers in the iOS and Android Smartphone Ecosystems,” *Organization Science*, 28(3): 531-551.

Class 5 (10/04): Technology Strategy Simulation and Debrief

Simulation: Back Bay Battery (HBS 7015-HTM-ENG)

Class 6 (10/05): Project Presentations and Course Wrap-up