

MIT SLOAN SCHOOL OF MANAGEMENT

15.358 Software & Internet Entrepreneurship

Spring 2019 (syllabus version November 25, 2018)

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This subject looks at new areas for business development related to recent and emerging software and internet technologies. There are three sets of ideas or conceptual frameworks that link the material in the course. (1) First is the concept of industry “platforms.” These are foundational technologies in multi-sided markets driven by network effects. Many third-party companies and individuals build complementary products and services or supply key assets through an ecosystem relationship, and this relationship generates positive feedback loops that make the platform increasingly valuable. Platforms contrast to standalone products and services, and have several characteristics that can lead to winner-take-all-or-most market outcomes. (2) Second is a set of ideas around business models and the differences between selling products versus selling services, or selling service-like versions of products such as Software as a Service, subscription pricing, or access to products and services via the cloud. (3) Third, is a set of ideas around how to create and identify a potentially successful new venture (either from scratch or within an established firm), including concepts associated with lean startups.

Anyone interested in founding, managing, or understanding a startup business based around software and digital technologies should be interested in this class. We cover opportunities for new businesses in both enterprise and consumer software products and services as well as social media and mobile apps. The strategic and technology issues are also highly relevant for other firms heavily dependent on software, such as in web retailing, financial services, and educational products and services. There are no prerequisites in terms of courses, experience, or technical knowledge, though some familiarity with software and internet products and services is highly desirable. We also welcome advanced undergraduate students with some industry experience, such as summer internships.

Another main feature of the course is that the students will have several opportunities to share what they know with the entire class through team presentations. The instructors have many years of experience studying, founding, serving on boards, and consulting for companies in the software and platforms business, broadly defined. However, the subject is so broad that many students in the class have deep expertise that we want them to share with the other students and the faculty. As a result, we will teach each other what we know about the technology and the business, relying on the class frameworks.

The first several sessions are devoted to “foundations” – building a common language and understanding of the three key sets of frameworks and concepts important to high-tech entrepreneurship in general and especially to software and internet businesses, broadly defined. The remainder of the

sessions explore different application areas. We vary the topics each year. Please see the current syllabus for details. We will also update the syllabus in terms of readings and study guide questions, so please check canvas before each class for the latest version.

Grading and Professional Standards

Grading will consist of 30% split between class participation and attendance, 30% from two individual reaction papers on the readings and lectures, 15% from the student team presentations, and 25% from the team project presentations and papers. We expect all students to follow strictly the Values at Sloan Professional Standards guidelines with regard to academic honesty in individual vs. team work as well as plagiarism. .

Guidelines for Weekly Student Team Presentations

The student team presentations are meant to be relatively short (generally 25-30 minutes followed by approximately 10-15 minutes of discussion) and to supplement the topic assigned for the day. We ask students to volunteer for one session to provide additional perspectives on the topics, based on their experiences, learning from other classes, or some additional research. They will meet with the instructors before class and then prepare discussion issues and brief presentations for the class. Each presenting group is also required to prepare slides which we will post on canvas after the class. The TA may also help facilitate assignments and meetings.

Guidelines for Reaction Papers (due March 18 and May 13)

The reaction papers are short essays (maximum 2 pages, single-spaced) that provide an opportunity to explore topics in the readings or the lectures in more depth. The goal is to go beyond what we are doing in class and bring in a more personal point of view, such as reflecting work or internship experience or additional personal knowledge learned in other classes or from your own reading and analysis. Please do not simply summarize facts or arguments in the readings and lectures or summarize what interested you class by class. The idea is to select a theme or related themes from the class and *react* to the facts or arguments (agree, disagree, suggest a different perspective, etc.) by *integrating or adding* something new to the topic from your point of view. Papers are to be uploaded to by the assigned deadline. Unless you have a medical excuse, late papers will receive a penalty of one-half grade. Late papers are unfair to class members who get their papers in on time.

Guidelines for Team Papers (due May 20)

The team paper should analyze a particular segment of an emerging or evolving business area related to software and internet business opportunities. You should demonstrate that you know how to combine an understanding of the key technology and the business issues, as we are examining in class. This must be a team paper (recommended size of 3-4 people; minimum 2 people). The team will also do a preliminary presentation of the work-in-progress contents, as scheduled in the syllabus, for feedback from the instructors and a guest commentator. As you submit emails stating your interest areas, we will begin grouping students together and suggesting teams. It is your responsibility to talk to other students in the class with similar interests and help the instructors and the TA form teams for the papers. We will distribute updated lists of student interests as they come in every week. Below are some more specific guidelines:

- *Topic:* Any segment of the software business, internet services, or a software-based digital technology platform, broadly defined. Most students have written about “emerging” areas, but you might also write about more established areas of the software business and how they are undergoing change,

commoditization, or whatever is important to the current state and future of the business. *You must inform the TA or Professor Cusumano as soon as possible of your topic and the team members.*

- *Length:* Roughly 15-20 pages of text, single-spaced, for a 3-4-person group. Shorter or longer for different size groups, as appropriate.
- *Contents:* (1) Make sure to do a thorough treatment of the key *technology* issues. (2) Make sure to do a thorough treatment of the key *business* issues (company strategies, business models, platform issues, capabilities of the competitors, what is needed to “cross the chasm” into the mainstream market, lessons from the past of similar companies or technologies, etc.). *Description* of technologies and companies is fine, but have some *analysis and interpretation* as well to help us understand what is important, what are key trends, who is likely to win or lose, etc.
- *Structure, Sources, Writing:* Make sure the paper has an *introduction* that tells us what the paper is about and how it is organized. Make sure the paper ends with a *conclusion* that gives some recommendations for the company or companies you looked at, and makes some predictions as to how you think the technology, market, or companies will do in the future. Publicly available information is sufficient. Make sure you cite your sources appropriately. Please also write in logical paragraphs in legible English! Each team should also upload the team paper to by the assigned deadline. Thank you!

Required Readings:

- Course packet (available on Study.net course site)
- Other readings posted on Canvas

EXECUTIVE SUMMARY – 15.358 Outline (Spring 2019)

1. **Foundations:** Topic: Software & Internet Entrepreneurship: Overview [Feb. 8]
Megatrends – Enterprises, Consumers, & Startups
How to Evaluate a Startup Venture in Software & Internet Services
 2. **Foundations:** Topic: Fundamentals of Platform Strategy and Market Dynamics [Feb. 15]
Lecture & Discussion/Class Exercise
 3. **Foundations:** Topic: Business Models - Products, Services, Subscriptions/Zuora Case [Feb. 22]
Lecture & Discussion
Case: Zuora
 4. **Foundations:** Topic: Deeper Dive - Finding the Platform in Your Product [March 1]
Lecture & Homework/Class Exercise (Guest: Andrei Hagiu)
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5. **Applications:** Topic: The Gig & Sharing Economy/Upwork Case [March 8]
Lecture & Discussion
Case: Upwork
Student Team 1 (Gig/Sharing Economy ventures)
 6. **Applications:** Topic: AI/ML & Big Data Analytics [March 15]
Lecture & Discussion/Guest Company Zylotech
Student Team 2 (AI/ML/Big Data Analytics space)

REACTION PAPER 1 (Due March 18, Sessions 1-6) ***SIP Week and Spring Break – No classes March 22 and 29***

7. **Applications:** Topic: AI/ML and Driverless Vehicles [April 5]
Case: Mobileye
Student Team 3 (driverless vehicle ventures – Waymo, automakers, etc.)
8. **Applications:** Topic: Internet of Things [April 12]
Lecture & Discussion
Student Team 4 (IoT ventures – GE Predix, others)
9. **Applications:** Topic: Cybersecurity [April 19]
Lecture & Discussion/Guest companies – Bitsight and CyberSaint
Student Team 5 (analysis of the visiting companies & competitors)
10. **Applications:** Topic: Blockchain [April 26]
Lecture & Discussion/Guests TBD
Student Team 6 (Blockchain ventures & applications)
11. **Applications:** Topic: Quantum Computing [May 3]
Case: D-Wave
Guests: Prof. Seth Lloyd and Prof. Ed Farhi, MIT
Student Team 7 (Quantum Computing technology & ventures)
12. **Applications:** Topic: Student Team Papers – Preliminary Presentations [May 10]
Guest: Ted Schadler, Forrester Research, VP, Consumer Technology & Media

REACTION PAPER 2 (due Monday May 13, Sessions 7-12) ***Team Papers Due Monday, May 20***

15.358 Lecture and Readings Outline (Spring 2019)

1. **Foundations**: Software & Internet Entrepreneurship - Overview [February 8]

The objectives for this session are to introduce the syllabus and course logistics, and then discuss some of the broader trends in software and internet technology and ventures. We will then discuss some key elements of learn startups and how to evaluate new ventures.

Lectures: Software & Internet Entrepreneurship: An Overview
Megatrends – Enterprises, Consumers, and Startups
How to Evaluate a Startup Venture in Software & Internet Businesses

Readings:

- Ben Putano, “6 Software Development Trends for 2018: Developers Needed,” *Stackify.com*, November 24, 2017 <https://stackify.com/software-development-trends-2018/> (Canvas)
- Chris Neiger, “15 Tech Trends to Watch in 2018,” *The Motley Fool*, December 27, 2017 <https://www.fool.com/investing/2017/12/27/15-tech-trends-to-watch-in-2018.aspx> (Canvas)
- Michael A. Cusumano and David B. Yoffie, “Extrapolating from Moore’s Law: Behind and Beyond Microsoft, Intel, and Apple,” *Communications of the ACM*, January 2016, pp. 33-35 [Canvas]
- Michael A. Cusumano, “Evaluating a Startup Venture,” *Communications of the ACM*, October 2013, pp. 26-29 (Canvas)
- Steve Blank, “Why the Lean Start-up Changes Everything,” *Harvard Business Review*, May 2013 (Study.net)

Study Guide and Discussion Questions

1. What are the most important trends in software and internet/digital services and platforms? Which of the new technologies seem to offer the best business opportunities for new ventures?
 2. What might be the next “Moore’s Law” – a disruptive innovation in the technology – that leads to breakthrough opportunities for software and digital business companies and platform competitors?
 3. When trying to evaluate a new venture in advance of it having actual products and customers, what can you know and when can you know it?
 4. What are the key characteristics of a “lean startup”?
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2. Foundations: Fundamentals of Platform Strategy & Market Dynamics [February 15]

The objectives for this session are to build a common vocabulary around platform strategy and market dynamics as they apply to software and other internet or digital platform and product businesses. We will define specifically what we mean by an “industry-wide platform,” look at the two main types of platform businesses, and analyze what distinguishes a “winner take all or most” (WTAoM) market. As time allows, we will also ask the class to propose what they expect to be the most important software and hardware platforms in the future.

Lecture: The Business of Platforms (M. Cusumano)

Exercise: Identifying new platforms technologies and market opportunities

Reading:

- Michael A. Cusumano, Annabelle Gawer, and David B. Yoffie, *The Business of Platforms: Strategy in the Age of Digital Competition, Innovation, and Power* (forthcoming, 2019), Chapters 1-3 (Canvas)

Study Guide and Discussion Questions

1. What are the key characteristics of an industry platform compared to a standalone product business?
 2. What is the main distinction between innovation and transaction platforms? What about hybrids?
 3. What factors drive “winner-take-all” outcomes in a market? How common are these outcomes?
 4. How does launching an innovation platform differ from a transaction platform?
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3. Foundations: Business Models - Products, Services, Subscriptions/Zuora Case [Feb. 22]

The objectives for this session are to examine the variety of business models that software and internet companies use as well as the transition in software from selling products to selling services in the form of Software as a Service (SaaS) and Cloud Computing offerings. We will then discuss the case of Zuora, a SaaS venture spun off from Salesforce.com that offers subscription-pricing solutions and which recently went public.

Case:

- “Zuora in 2017: Leading the Subscription Economy Revolution,” Stanford Business School Case #SM-284, May 31, 2018
- Video: Tien Tzuo, “The Subscription Economy,” August 24, 2018 https://www.youtube.com/watch?v=80_PhJE6rUo (6 minutes)
- Julie Bort, “Zuora Soars in its IPO, and the Founders’s Stake is Worth Nearly \$200 Million,,” *Business Insider*, April 12, 2018 <https://www.businessinsider.com/zuora-soars-in-its-ipo-founders-stake-is-worth-nearly-200-million-2018-4> (Canvas)
- Zuora latest financial data to be posted

Readings:

- Michael A. Cusumano, “Finding Your Balance in the Products and Services Debate,” *Communications of the ACM*, March 2003, pp. 15-17 [Canvas]
- Michael A. Cusumano, “The Changing Labyrinth of Software Pricing,” *Communications of the ACM*, July 2007, pp. 19-22 [Canvas]
- Michael A. Cusumano, “Cloud Computing and SaaS as New Computing Platforms,” *Communications of the ACM*, April 2010, pp. 27-29 [Canvas]
- Louis Columbus, “Roundup of Cloud Computing Forecasts and Estimates, 2018,” *Forbes.com*, September 23, 2018 <https://www.forbes.com/sites/louiscolumbus/2018/09/23/roundup-of-cloud-computing-forecasts-and-market-estimates-2018/#5c1ea739507b> (Canvas)

Study Guide and Discussion Questions

1. What are the different business models used in the software industry? Why has Software as a Service become so popular to customers? Do you think it is preferable among software companies?
2. How strong are the network effects supporting different cloud vendors like Amazon and Microsoft? Does this seem to be a winner-take-all-or-most market? If so, who is likely to win in the long run?

Zuora Case

1. In 2017, how attractive is the SaaS industry and what seems to be fueling its growth? How do you know?
 2. What is Zuora’s strategy? Its competitive advantage? How should Zuora refine its strategy going forward?
 3. What does Zuora need to do in order to build a platform that can serve as the “hub” connecting CRM and ERP capabilities and an ecosystem of partner companies?
 4. How well has Zuora’s strategy-making process worked?
 5. How effective has CEO Tien Tzuo been as the leader of the company? What could he do better?
 6. What should Tien Tzuo do to achieve both growth and profitability, especially now that it has gone public?
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4. Foundations: Deeper Dive - Finding the Platform in Your Product [March 1]

The objectives for this session are to examine how standalone products and services may be turned into platform businesses, and analyze the logic for when a product or service company should pursue a platform strategy. **There will also be a class exercise with a homework assignment.**

Guest Lecturer: Professor Andrei Hagiu, Boston University

Readings:

- Andrei Hagiu and Elizabeth J. Altmann, “Finding the Product in Your Platform,” *Harvard Business Review*, July-August 2017 (Study.net)
- Andrei Hagiu, “Strategic Decisions for Multi-Sided Platforms,” *MIT Sloan Management Review*, Winter, 2014, pp. 71-80 (Study.net)
- Andrei Hagiu, “The Best Way for Netflix to Keep Growing,” *Harvard Business Review Online* August 14, 2018 <https://hbr.org/2018/08/the-best-way-for-netflix-to-keep-growing> (Canvas)

SPECIAL HOMEWORK ASSIGNMENT QUESTIONS

1. Why should product or service companies attempt to become multi-sided platforms (MSPs)?
2. What attributes of a product or service make it a particularly good candidate for becoming an MSP?
3. Choose one of the following products or services:
 - Dorito’s chips
 - Spirit Airlines
 - Corning Gorilla Glass (<http://www.corning.com/gorillaglass/worldwide/en.html>)

For your chosen product/service, briefly explain (280 characters or less) how you would turn it into an MSP using one of the 4 methods described in the HBR article. Please tweet your answer at me (@theplatformguy). Be creative – while still making (some) business sense. Top 3 best answers will be announced and will receive a prize in class.

5. Applications: The Gig & Sharing Economy/Upwork Case [March 8]

The objectives for this session are to discuss the gig/sharing economy phenomenon and how it has led to a variety of new ventures and “unicorns,” including Uber and Airbnb. We will analyze why most of these firms have yet to make a profit. Then we will discuss the case of Upwork, a freelance work platform that recently went public.

Case:

- “Upwork: Creating the Human Cloud,” Harvard Business School Case # 9-718-402 (July 31, 2018)
- David Trainer, “Upwork IPO: The Online Freelance Platform Not the Worst Public Debut of the Year,” *Forbes.com*, October 3, 2018
<https://www.forbes.com/sites/greatspeculations/2018/10/03/upwork-upwk-ipo-not-the-worst-of-the-year/#7dc7c83aa553> (Canvas)
- Video: Upwork CEO on CNBC, October 3, 2018 <https://www.youtube.com/watch?v=pHo4c1MPvJo>
- Upwork latest financial data to be posted

Student Team 1: Deeper Dive into Other Gig/Sharing Economy Ventures

Readings:

- Michael A. Cusumano, “How Traditional Firms Must Compete in the Sharing Economy,” *Communications of the ACM*, January 2015, pp. 32-34 [Canvas]
- Michael A. Cusumano, “The Sharing Economy Meets Reality,” *Communications of the ACM*, January 2018, pp. 26-28 [Canvas]

Study Guide and Discussion Questions (Upwork Case)

1. Is the market for freelance labor likely to tip to one big winner? Why or why not?
 2. How strong are the network effects generated by the Upwork platform? How can the company make the network effects even stronger?
 3. Analyze Upwork’s Profit & Loss statement. Why does the company continue to lose money? What can the company do to change this situation?
 4. What is “curation” on the Upwork platform? Does this help or hurt the business?
 5. What should be CEO Kasriel’s strategic priorities going forward? Remember, the company is now public.
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6. Applications: AI/ML & Big Data Analytics [March 15]

The objectives for this session are to examine how artificial intelligence and machine learning technology is being applied in Big Data analytics. We will discuss some applications and ventures, including venture capital trends, with some guest speakers and entrepreneurs. A student team will also analyze some promising ventures.

Guest Company: Zylotech co-founder (Abhi Yadav), executive team, and board members

Student Team 2: Analysis of the AI/ML/Big Data Analytics space

Readings:

- Zylotech company information: <https://www.zylotech.com>
- Justin Hoffherr, “MIT Spinout Zylotech Raises \$5.5 Million to Accelerate AI-Driven Marketing,” October 30, 2018 <https://www.builtinboston.com/2018/10/30/zylotech-raises-5m>
- Abhi Yadav, “How to Master Customer Retention Using Artificial Intelligence,” *Forbes.com*, November 17, 2017 <https://www.forbes.com/sites/forbestechcouncil/2017/11/17/how-to-master-customer-retention-using-artificial-intelligence/#2003a71c2fad>
- Nick Heath, “What is Machine Learning? Everything You Need to Know,” *ZDNet*, September 14, 2018 <https://www.zdnet.com/article/what-is-machine-learning-everything-you-need-to-know/> (Canvas)
- Daniel Fagella, “Predictive Analytics for Marketing – What’s Possible and How It Works,” *Techemergence.com*, June 1, 2018 <https://www.techemergence.com/predictive-analytics-for-marketing-whats-possible-and-how-it-works/> (Canvas)
- “How Much Artificial Intelligence Does IBM Watson Have?” *Seeking Alpha*, July 13, 2017 <https://seekingalpha.com/article/4087604-much-artificial-intelligence-ibm-watson>

Study Guide and Discussion Questions

1. What different technologies are there for artificial intelligence? How is AI similar or different from machine learning (ML)?
 2. What AI/ML approaches are the major software and hardware companies emphasizing and integrating into their products, services, and platforms (Google, Microsoft, Amazon, Apple, IBM)?
 3. How is AI/ML being used in big data applications, such as for marketing and customer intelligence?
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REACTION PAPER 1 DUE – Monday, March 18

Please write a short essay (maximum of 2 pages, single-spaced) reacting to what you have learned from the required or recommended readings and class discussions through the foundation sessions 1-6. See the syllabus for further guidelines. Please upload to Canvas.

7. Applications: AI/ML and Driverless Vehicles [April 5]

The objectives for this session are

8. Applications: Internet of Things [April 12]

The objectives for this session are

9. Applications: Cybersecurity [April 19]

The objectives for this session are

10. Applications: Blockchain [April 26]

The objectives for this session are

11. Applications: Quantum Computing & Science-Driven Entrepreneurship [May 3]

The objectives for this session are to consider a basic approach to technology forecasting and then look into the current state of a new technology called quantum computing and the leading venture company in this space, D-Wave Systems (www.dwavesys.com), initially funded by Draper, Fisher, Jurvetson. D-Wave has introduced a product and a service, and is also trying to push forward the field of quantum computing with a particular strategy for acquiring intellectual property, with a focus on applications such as cryptography, biotechnology research, and optimization. Quantum computing experts from the MIT School of Engineering, Professors Seth Lloyd and Ed Farhi, will also join the class. A student team will also evaluate the current state of quantum computing ventures at new and established firms.

Guests: MIT Professor Seth Lloyd <http://meche.mit.edu/people/index.html?id=55> and
MIT Professor Ed Farhi http://web.mit.edu/physics/people/faculty/farhi_edward.html

Student Team: Evaluation of quantum computers technology & business opportunities

Readings:

Michael A. Cusumano, "The Business of Quantum Computing," *Communications of the ACM*, October 2018, pp, 20-22

D-Wave Case:

- Lev Grossman, "Quantum Leap," *Time Magazine*, 2/17/2014, cover story [Canvas]
- Other

Other Reading on D-Wave & Quantum Computing (articles on the web)

- <http://www.pbs.org/wgbh/nova/tech/quantum-computing.html> (MIT Professor Seth Lloyd)

Other Short Videos (we may show some portions in class):

- <http://www.youtube.com/watch?v=hSr7hyOHO1Q> (Scientific American, how quantum computers work)
 - <http://www.youtube.com/watch?v=veDS0D8IEoM> (Demo of a quantum computer at UNSW 9-2012)
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12. Team Paper Presentations and Feedback [May 10]

The objectives for this session are for each paper team to share an overview of their topic and some preliminary outline and analysis with the entire class and then receive some feedback from faculty, guest commentator Ted Schadler of Forrester Research (a former MOT/Sloan Fellow, who wrote one of the early master's theses at MIT on B2B internet applications back in 1996). Ted will also give us a brief presentation on how he and colleagues at Forrester think about technology forecasting.

Guest: Ted Schadler, Forrester Research, VP
http://www.forrester.com/rb/analyst/ted_schadler

REACTION PAPER 2 DUE – Monday, May 12

Please write a short essay (maximum of 2 pages, single-spaced) reacting to what you have learned from the required or recommended readings and class discussions through sessions 7-10 and 12. See the syllabus for further guidelines. Please upload to Canvas.

15.358 ideas for 2019

“Gig” or “Sharing economy platforms

- Upwork case
- Short Lecture (MC) and
- Airbnb, Uber; Zomcar – Uber for kids (Bilal)
- Student team

AI and Machine Learning applied to Driverless Cars

- Lecture -- AI/ML Platforms – infused into everything (Imran)
- Self-Driving cars
 - Mobileye case? Others?
 - Waymo
 - Nuro?
- Student team: Startups vs. Incumbents (GM, Toyota, BMW, Mercedes, Bosch, etc.)

Internet of Things – Industrial vs. Consumer

- Lecture (Imran/MC?)
- Consumer – voice-enabled AI home devices (Yoffie case)
- Industrial (Predix) – Empiric.AI (Imran startup in London)
- Student team

Cybersecurity & Internet Fraud

- Platforms as double-edged swords (MC)
- Bitsight – guests (Naggs and/or Steven Boyer)
- Security software – guest lecture (George Wrenn -- <https://www.cybersaint.io>)
- Student team

Blockchain applications

- Lecture – why blockchain will change the world or it’s a scam (Imran)
 - NYT and other readings
- Cryptocurrencies, supply chain, documents, agriculture, etc.
- Startups vs. Incumbents (Circle Financial)
- Student team

Quantum computing as a business

- Lecture (MC)
- D-Wave, IBM, Microsoft, Google
- Startups -- 1Qbit, Quantum Leap, Cambridge Quantum
- Student team