

Real Estate Disruptions

REAL 375/875 – JMHH 245

Instructors:

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Canvas (to deliver assignments and receive grades): <https://canvas.upenn.edu/courses/1467993>

Piazza (for communication with us, among students, announcements, etc):

<https://piazza.com/class/jyg0fyxyh0p50s>

Course rationale:

Real Estate is changing dramatically for the first time in perhaps one hundred years. This class will examine how technology is changing in many facets (all) of the industry. Among the many questions we will consider:

- Can you crowd fund development? Can every building in the world now be publicly listed as a stock? Will it happen?
- Will the advent of AI dramatically reduce space needs? Will the office business become a part of hospitality? In what type of spaces will workers want to live and work? Do people need their own apartments or will renting an adult dorm room be enough?
- Can we build new buildings like we assemble legos? What are smart buildings? What is the future of emerging building management giants?
- How will autonomous vehicles affect the demand for space? How will that affect property values? Is multistory distribution the future of last mile, will it be last inch delivery in people's residential buildings or will self-driving/ flying delivery solve the problem of moving goods in an e-commerce world?

- What is the future of new data analytics services? Will they remain small independent niches? Or will they be taken over by incumbent players? Will they become the new core of the industry?
 - More generally, what will all the emerging changes that are occurring today amount to? How will technology fundamentally redefine the real estate industry?
- This course will address how technology has already changed the demand for real estate, how it will likely change in the future the way real estate is used, designed, developed, constructed, managed, leased, maintained, and financed.

Course objectives:

This course aims to:

- Provide an overview of the emerging trends and help students form reasonable conjectures about where these trends will lead us.
- Get the students to think critically for themselves about what the next great opportunities are in real estate / real estate technology and foster students' skills at detecting, analyzing, and handling change and disruption.
- Foster the ability of students to articulate their analysis orally and in written form.
- Make students better decision-makers and real-estate industry leaders.

Course structure:

This course will bring together a recognized industry leader (Richard Mack), Wharton faculty (Gilles Duranton), and a broad set of guest lecturers (Start-up entrepreneurs, incumbents, VCs, non-RE technology specialists, etc). We believe there is no one single approach to gain insight about disruptions and change under uncertainty so we will propose a mix of approaches including, in-depth case-studies, interactions with guest lecturers who handle those issues daily, learning from economic history and other industries, and drawing from core economic concepts.

Grading/evaluation:

- 2 memos: 20% each, 40% in total
- 1 business plan for a disruptive RE tech start-up due at the end of the class: 40% (with equal weight to the presentation and the paper)
- Class participation/attendance: 20%

The first memo should provide an analysis of the business model of a real-estate tech start-up that operates either in the finance/lending/intermediation space (session 2) or one that seeks to benefit from recent changes in lifestyle or in the nature of work (session 3). It should cover:

- Its value proposition: Which previously unmet demand does it serve, how valuable is it, and how does it capture this value? (What would happen if this company did not exist – what is the customers' next best alternative to meet their needs?)
- Its market and competition: What are the main competitors and how sustainable is the startup's competitive advantage?
- Risks and challenges: What are the key threats? (Regulatory, technological feasibility, future changes in technology, etc.)
- Do you think this business is likely to prosper in the medium-term?

(Note: no pro-forma financial analysis needed for this memo).

This memo should be completed and submitted individually via Canvas before session 4 on September 17 (deadline at 2.45 pm). It should be less than 1,200 words.

The second memo should provide an outline for possible RE start-up idea in RE construction, operation (session 4) or infrastructure (session 5). This should not be a fully developed business plan. The assignment should outline the basics of the idea, how you discovered it, and what your next steps would be to assess the idea further. The memo should nonetheless make the case for both the economic rationale of your project (where is the value coming from and how it will be appropriated) and its technological feasibility (i.e., your idea should rely on available technologies or incremental improvements of available technologies).

Like the first memo, the second memo should be completed and submitted individually via Canvas. The deadline is on October 1st (deadline at 2.45 pm) before the start of session 6. Again, it should be less than 1,200 words.

For both memos, you are welcome to discuss ideas together but your submission should be yours and yours only. You may share the same starting point but the execution should differ. In this case, please also disclose the name of the classmate with whom you had an idea in common on your written submission. Failure to disclose this information and submit substantively different assignments will result in a large penalty.

The business plan should develop an idea for a start-up in any area of RE tech. It should cover:

- Its value proposition.
- Its market and competition.
- Risks and challenges, including regulatory challenges, and how you are planning to address them.

- Financial prospects, including a pro-forma financial plan, statement of likely sources of financial capital, and a division of equity if relevant.
- Research, including talking to potential suppliers or customers or engaging in any relevant effort that would help you understand how your plan will work in the real world.

For this business plan, you will work in teams of 5 or 6 (depending on class enrollment). Each team will make a 10 minute pitch during the last session. A written document of less than 4,000 words is also due before midnight on Friday October 18th after the last class (one team member should submit via Canvas).

Regarding teamwork, it is your responsibility to make sure your entire team prepares its business plan independently. Violations by any team member will result in the entire team getting a zero on the assignment. Teams may also decide to expel free-riders (or notify us about them).

No late assignments will be accepted.

While attendance and participation matter, we also emphasize the importance of the writing component of this course. Neatness, organization, clarity, grammar, punctuation, spelling, and conciseness matter and will impact your grade. Remember that poor writing is the main complaint of employers of business graduates (including Wharton's).

Class preparation:

Case material will be shared before each session. Please be prepared. Please also bring your name tents to each class. At any time, we will make cold calls to facilitate student commenting during class. We will strive to get everyone to participate. If you feel we have ignored you, please let us know. We will also ask you to provide questions for our guests ahead of time via Piazza (and this is part of your participation). This will help us steer our guests and manage the Q&A.

Class participation:

In evaluating class participation, we will consider the following:

- Is the participant a good listener?
- Are the points that are made relevant to the discussion? Are they linked to comments of others?
- Do the comments show evidence of having completed assigned readings?

- Do they move the discussion forward by introducing new aspects or issues to consider, or do they restate points that have already been made?
- Do they demonstrate willingness to take risks and test new ideas, or are they “safe”?
- Do they participate constructively on Piazza?

Please keep in mind the following:

- Well-posed questions are not only a legitimate way to interact but should be an important part of our discussions.
- In most of the issues we will discuss, there will be some controversy in the industry and even within firms about the best course of action. Your two instructors and the guest speakers do not have all the answers (and they often will not agree with each other). Enlightened debate can add significantly to the understanding of the issues.
- Because of the varied backgrounds in the class, many of you will have important contributions to make based on your personal and professional experience. We will try to learn about your backgrounds over the course of the term, but you are encouraged to bring these experiences to bear in the discussion.

Other policies:

- Prerequisites. Students are responsible for knowing the material covered in Real Estate Investments (REAL/FNCE 209 AND 721). The class will be taught assuming you have mastered these topics. This pre-requisite is STRICTLY enforced unless the class is under-subscribed.
- Whatever seat you choose on the first class meeting is yours for the entire course. Please sit there every class. Again, use your name tent.
- A general no electronics rule applies. That includes phones, tablets, and laptops.
- Material provided in this course is for your personal, noncommercial use and may not be copied and distributed to others without the prior permission of the copyright owner.

Getting help:

- Contact us. Do not think that a question is too “basic”. We are happy to help students understand any material they are having difficulty with. Please try on your own first. We hold regular office hours, schedule appointments, and can answer questions through Piazza (about course issues) or by email (about more personal circumstances).

Course schedule

(This schedule might be subject to minor changes as our guests may change following cancellations at short notice.)

1. Introduction to the class, context (August 27)

GD/RM: welcome, introductions, ground rules, etc

RM: broad outline on the RE industry today and current strategies to handle change

GD: background on growth and technology

Guest: Randy Torres or Paul Keller of MREG

Mini-case: Greenpoint Brooklyn / Aven (LA)

2. Lending and capital markets for real estate (September 3)

GD: How is technology changing RE investment (or not)?

RM: Computing and past financial innovations (RMBS and CMBS), what current changes mean for RE

Case study: A tokenization decision

Guest speaker: Daniel Doll-Steinberg from Atari Token and Blockchain Smokers

Group discussion: Will technology allow for the democratization of real estate ownership thereby increasing value and liquidity?

3. Changes in Demand (September 10)

Discuss last week's case study/speakers

GD: Recent global changes in the demand for locations (across cities and within cities)

RM: Trends in the demand for 'products': residential, retail, parking, office and distribution.

Lease intermediaries as outsourced facility managers, future of brokers

Guest speaker 1: TBD

Guest speaker 2: Richard Baker (Hudson Bay) on the Lord & Taylor building in NYC

Group discussion: Do previous property type distinctions apply to a technology-enabled society?

4. Operation and construction (September 17)

Discuss last week's case study/speakers

GD: How technology affects scale, monitoring, holdup, etc. (the key frictions in operations and constructions). What can we expect from smart buildings?

RM: Regulatory and capital market challenges to technological advances in construction, changes in how space is bought or leased. Security deposits. Workflow assessment.

Case study (TBC): Yardi and the leasing and management integration

Guest speaker: Jessica Beck and/or Marcela Sapone from Hello Alfred

Guest speaker: Jim Goetz from Sequoia Capital (TBC)

5. Infrastructure / autonomous vehicles (September 24)

Discuss last week's case study/speakers

GD: Projected effects on cities and RE of autonomous vehicles

RM: RE and autonomous vehicles: transit, parking (focus on Metropolis), public-private partnerships, zoning and development incentives.

Guest speaker: Ryan Johnson and/or Jeff Berens from Culdesac

Group discussion: How public infrastructure increases real estate values and what role should the private sector play in public infrastructure in a technology-enabled future?

6. Analytics and big data: challenges and opportunities (October 1)

Discuss last week's case study/speakers

GD: Data and analytics challenges in RE

Interactive data exercise: predicting houses prices

RM: Investment committee data analysis and investment analysis. Tech, real estate and data (e.g., what is WeWork). Analytics in retail (people shopping behavior/habits in retail centers).

Guest speaker 1: Richard Sarkis from Reonomy

Guest speaker 2 (TBC): Someone from A Retail Space

7. Open session with Gilles Duranton (October 8 – It's Yom Kippur)

TDB

8. Integrative session: the promises of RE tech (October 15)

Student presentations/pitches: 10 minutes per team

Integration panel: with Zach Aarons (MetaProp) – TBC - and (TBD)

Reading list

Forewords about the readings. Because we will be dealing with changes that, for many of them, are still in the making and concern a specific industry, standard texts and articles are scarce. Luckily, we have a main text, *PropTech 101*. While we will not discuss it explicitly in class, it will be relevant for most of our sessions. It also provides numerous insights and has the great merit of being current. The rest of the readings are divided into roughly two groups. Traditional chapters and research articles are providing context. However, for most of them they were written without a real estate focus. Shorter pieces and press articles are more directly focused on the real estate industry but will often remain superficial or lack a broader perspective.

Main text (recommended).

- Block, Aaron, and Zach Aarons. 2019. *PropTech 101*. Charleston (SC): Advantage.

(It's not available in the bookstore but can be ordered on Amazon easily).

1. Introduction

(Mostly background readings, they should help give you a sense of perspective but they don't need to be read line by line, especially the first, second, and third).

Disruption vs. growth.

- Brynjolfsson, Erik , Daniel Rock, and Chad Syverson. 2019. Artificial Intelligence and the Modern Productivity Paradox: A Clash of Expectations and Statistics. Chapter 1 in: *The Economics of Artificial Intelligence*, Agrawal, Ajay, Joshua Gans, and Avi Goldfar (eds). Chicago (Il): University of Chicago Press.

- Tirole, Jean. 2017. Chapter 15: Digital economies and the challenges to society. *Economics for the common good*. Princeton (NJ): Princeton University Press.

General-purpose technologies.

- Jovanovic, Boyan, and Peter L. Rousseau. 2005. General purpose technologies. *Handbook of Economic Growth*. Vol. 1. Elsevier 1181-1224.

Platforms.

- Evans, David S. and Richard Schmalensee. 2016. Chapters 1, 2, 3, and 4. *Matchmakers: The New Economics of Multisided Platforms*. Harvard Business Review Press.

- Tirole, Jean. 2017. Chapter 14: How digitalization is changing everything. *Economics for the common good*. Princeton (NJ): Princeton University Press.

Other background readings.

- Tirole, Jean. 2017. Chapter 16: Innovation and Intellectual Property. *Economics for the common good*. Princeton (NJ): Princeton University Press.

2. Finance

Background

- Gai, Keke, Meikang Qiu, and Xiaotong Sun. 2018. A survey on FinTech. *Journal of Network and Computer Applications* 103: 262-273.
- Philippon, Thomas. 2019. The Fintech opportunity. Mimeographed, NYU.

Shorter readings

- Habibian, Sina. 2018. The tokenization of real estate. www.sinahab.com

3. Changes in demand

(Again, a lot of background readings since the session will cover a lot of ground).

Changing geography across cities

- Autor, David H. 2019. Work of the Past, Work of the Future. *American Economic Review* 109. Forthcoming. (Only a part is directly relevant but this a great general piece on the evolution of labor markets in the US).
- Duranton, Gilles. 2013. The growth of US Cities. *Revue d'Economie Régionale et Urbaine*: (5) 857-876.

Changes within cities

- Couture, Victor and Jessie Handbury. 2019. Urban Revival in America. Mimeographed, Wharton School of the University of Pennsylvania. (Ignore the more technical parts)
- Hwang, Jackelyn, and Jeffrey Lin. 2016. What Have We Learned About the Causes of Recent Gentrification? *Cityscape: A Journal of Policy Development and Research* 18(3) 9-26.

Shorter readings

- Badger, Emily. 2019. Why Technology Hasn't Fixed the Housing Crisis. *New York Times* (January 29).
- Reader, Ruth. 2019. WeWork grows up (and out and everywhere). www.fastcompany.com

- Platt Eric, and Andrew Edgecliffe-Johnson. 2019. WeWork: the 'hypothetical' company at the heart of the property market. *Financial Times* (July 2).

4. Operation and construction

Shorter readings

- Intel. 2015. Increasing property owner profitability with the internet of things. Solution brief, smart buildings.
- Green Street Advisors. 2019. Automating the cube. Industrial Insights.

5. Infrastructure

Self-driving cars.

- Duranton, Gilles. 2016. Transitioning to driverless cars. *Cityscape: A Journal of Policy Development and Research* 18(3) 193-196.
- Fuller, Brandon. 2016. Cautious optimism about driverless cars and land use in American metropolitan areas. *Cityscape: A Journal of Policy Development and Research* 18(3) 181-184.
- MacDuffie, John Paul. 2018a. The policy trajectories of autonomous vehicles. Wharton PPI issue brief 6(4).
- MacDuffie, John Paul. 2018b. Long road ahead: The promise — and perils — of self-driving cars. Knowledge @ Wharton, July.

Contrasted views about the state of US urban infrastructure

- Rosen, Ken, and Max Hall. 2019. Why infrastructure is a pressing Issue for the real estate industry. RCG Report.
- Turner, Matthew A. 2019. Local transportation policy and economic opportunity. Hamilton Project, Brookings Institution.

6. Analytics and data

- Azevedo, Eduardo M. and E. Glen Weyl. 2016. Matching markets in the digital age. *Science*, 352(6289), 1056-1057.
- Hansen, Lars Peter. 2019. Purely evidence-based policy doesn't exist. *Chicago Booth Review* (Spring).

Shorter readings

- Rizzi, Nicholas. 2019. Leaving tracks. *Commercial Observer* (June25 – July 2).

- *The Economist*. The world's most valuable resource is no longer oil, but data. June 20, 2019.

Other useful readings

- Sahlman, William A. 1997. How to Write a Great Business Plan. *Harvard Business Review* (July-August), 98-108.
- Glaeser, Edward L. 2011. *Triumph of the city: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier*. New York: Penguin Press.