

Real Estate Disruptions

REAL 3750/8750 – Classroom: JMHH 240.

Fall 2023/2024 – Tuesdays 3.30 – 6.30

Instructors:

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Mr. Richard Mack

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Teaching assistants:

Claire Zhong (clairegz@wharton.upenn.edu) – classroom and outside support

Genevieve Liebes (gliebes@wharton.upenn.edu) – grading.

Canvas:

<https://canvas.upenn.edu/courses/1741391>

We will also use the canvas discussion board for pre-class questions to guests.

Please use the canvas discussion board in the first instance for anything that is not a personal communication (clarification questions about assignments, extra sessions, etc).

Key dates:

Regular classes: 08/29 (first day is mandatory), 09/05, 09/12, 09/19, 09/26, 10/03, 10/24, 10/31, 11/07, 11/14, 11/28, 12/05 (final session)

No class for MBA students on: 10/10 (core exams), 10/17 (opportunity week), 11/21 (Thursday schedule)

Special undergrad session: and

1. Primer on RE financials (9/8 at 2 pm, remote)
2. Visit: Pennovation (10/17 at 4 pm)

Dates for main assignments:

Memo 1: 09/19 (3 pm, before class)

Memo 2: 10/24 (3 pm, before class)

Memo 3: 11/07 (3 pm, before class)

Test: 11/28 (in class)

Final business plan: 12/15 (11.59 pm)

Speaker discussions: most classes (due at 3 pm before class, canvas announcements)

Quizzes: Unannounced

Course rationale:

Before the covid pandemic, real estate was already changing dramatically for the first time in perhaps one hundred years. Covid has accelerated some of these changes and modified others. This class will examine how technology is changing in many facets (all) of the industry. Among the many questions we will consider:

- How is the covid pandemic accelerating existing trends, curbing others, and creating new demands?
- 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?
- How will the industry adapt to rising environmental concerns and mounting regulations?
- 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. We will also pay a lot of attention to changes on the demand side.

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:

- 3 memos: 35% (1 and 2: 12%+3% for grading, 3: 5% + 5% bonus if selected)
- Midterm test 10%
- Feedback on guest speakers / comments on readings (5 times 2% => 10%)
- Quizzes: 5% bonus
- 1 business plan for a disruptive RE tech start-up due at the end of the class: 25% (with equal weight for the presentation and the paper)
- Class participation/attendance: 20%

For all assignments, detailed guidelines are provided in a separate document.

The first memo will provide an analysis of the business model of a proptech start-up. Think about it as a memo for your investment committee, not as some infomercial for the startup you are looking at.

This memo should be completed and submitted individually via Canvas on **09/19 before 3.00 pm**. It should be a **pdf file** of no more than 1,500 words.

This memo will be graded using WHOOPPEE, a peer evaluation grading mechanism for which you will need to grade five other memos.

The second memo will provide an analysis of one “segment” of the value chain in real estate. Think about this assignment as a “Real Estate brief” to be published in *The Economist*. Our assignment guidelines document contains a list of candidates and you can approach us with suggestions.

This memo should be completed and submitted individually via Canvas on **10/24 before 3.00 pm**. It should be a **pdf file** of no more than 1,500 words.

This memo will also be graded using WHOOPPEE.

The third memo will provide an outline for possible RE start-up idea.

This memo should be completed and submitted individually via Canvas on **11/09 before 3.00 pm**. It should be a **pdf file** of no more than 1,200 words.

We will select the best 10 or so which will get an extra bonus. These 10 best ideas will form the basis of the business plans for the final assignment.

The business plan should develop an idea for a start-up in any area of RE tech. 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 (pdf) of less than 5,000 words is due on **12/15 before 11.59 pm** (one team member should submit via Canvas).

We will use Feedback Fruit so that team members can evaluate each other's participation.

No late assignments will be accepted (WHOOPEE makes them nearly impossible to manage in any case).

Before class: Read assigned readings, prepare for cases, and suggest a question to our guest speaker on Canvas (as part of your participation). The requirements will be highlighted in an email on Wednesday or Thursday before the next class.

During class: we take attendance, and keep records of all in-class interventions. For attendance, we give you two free passes. About the in-class participation, please keep in mind that we can cold call you and that we prefer quality over quantity. See our assignment guidelines for further details. Keep in also in mind that Canvas participation also counts towards your overall participation.

After class: We will create some Google forms asking you to react critically to our guest speakers and / or the readings. We will circulate the question(s) and link on Canvas soon after class and will ask you to provide a one paragraph answer to each of one or more questions (with some word limits). There will be six such Google forms. The assessment is pass/fail and we consider the best five (2% each, 10% total).

Other policies:

- Prerequisites. Students are responsible for knowing the material covered in Real Estate Investments (REAL/FNCE 2090 AND 7210). The class will be taught assuming you have mastered these topics. This pre-requisite is STRICTLY applied. Please contact us for any exception.
- 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 Canvas (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, the covid acceleration (08/29)

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

GD: The postcovid economy and RE

RM: The covid acceleration in RE

RM: General presentation on business plans

Panel: VCs and RE entrepreneurs

- VCs and start-ups in the post covid era
- What do VCs expect to see in business plans?

Jake Fingert (Camber Creek)

Alec Ellison (Houlihan Lokey)

Jorey Ramer (Super)

2. Business plans for Proptech start-ups and preparing for assignments (09/05)

GD/RM: Business plans and investment memos to discuss

GD: From business plans to class assignments (do's and don'ts, unit economic analysis of preliminary projects)

Guest speaker: Adam Kessler (VP Corporate Strategy, NBCUniversal Media) Disruptions in other industries (entertainment).

Special session for undergrads (Friday 9/8 at 2pm on Zoom): catching up with the basics of real estate

PLEASE NOTE THE DAY AND TIME (OUTSIDE THE REGULAR SCHEDULE)

Guest speaker: Cash flow model (Jonathan Goldberg from Mack Real Estate Group)

RM: The real estate ecosystem.

3. Financing RE (09/12)

Discuss last week's speaker presentation

Case study: How will blockchain transform real estate

Guest speaker: Eric Peters (One River Asset Management) 5 pm.

RM: Funding ventures. Financial innovations, what current changes mean for RE

GD: Information problems in RE finance and beyond

4. AI/Data analytics in RE (09/19)

Guest speaker: Mike Gordon (JPMorgan Asset Management) at 3.30.

Guest speaker: Daniel Doll-Steinberg (EdenBase, book author: *Unsupervised*)

Guest speaker: Andrea Jing (AJS Advisory).

GD: Data and analytics challenges in RE

5. Brokerage and disintermediation (09/26)

Discuss last week's speakers

GD: The economics of platforms

RM: What can be disintermediated in brokerage? What not?

Case: Can Residential Brokerage be Fully Automated?

Guest speaker: Pamela Liebman (CEO Corcoran).

6. Changes in demand for RE assets, part 1 asset classes (10/03)

Discuss last week's speaker

RM (remote, until 5pm): Trends in the demand for assets, fuzzy boundaries, asset conversion, etc.

Guest speaker: Richard Baker (Hudson Bay)

Guest speaker: Shegun Holder (Founder WorkEverywhere) --- TBC

GD: Why asset quality is unlike other attributes

Special session for undergrads (10/17 at 4 pm, logistical details to follow)

Site visit: Pennovation (Denita Henderson and Edwin Datz, Penn)

PLEASE MAKE SURE TO BE ON LOCATION ON TIME

7. Changes in demand for RE assets, part 2 geography (10/24)

Discuss last week's speakers

GD: Work from home and changes in the geography of cities

RM: Emerging investment opportunities.

Guest speakers: Mike Amato (CEO AKER)

8. Infrastructure (10/31)

Discuss last week's speaker

RM: Infrastructure as an urban service (and urban service as infrastructure)

GD: The urban mobility challenge

Case: Investing in micromobility

Guest speaker: Johan Pfeiffer (Managing director, Morgan Stanley Infrastructure Partner)

Panel: Reinventing the curb

9. Operating real estate and single-family rentals (11/07)

Discuss last week's speaker

Case: Multifamily asset class

GD: How will technology change the structure and control in the industry?

RM: Formalizing single family rentals

Guest speaker: Minna Song (CEO Meet Elise)

Guest speakers: Jenee Willstead and Richard Biletta (head of property management, MREG)
OK

10. ESGs in RE (11/15)

Discuss last week's speakers

GD (S): Housing and discrimination.

RM (S): Minorities in RE

Guest speaker (S): Cedric Bobo (Project Destined)

Guest speaker (S) Dan Tangherlini (Managing director, Emerson Collective) TBC

Guest speaker (E): Stephen Rothstein (recent MBA grad and course alumn, Hudson Sustainable Group)

Case (E): Climate tech for real estate

11. Construction and the Environment (11/28)

One-hour midterm test

Discuss last week's speakers

Case: New technologies in construction

RM: The challenge of modular construction

Guest speaker: Arlan Collins (Sustainable Living Innovations)

Guest speaker: Louis Schotsky (Navitas)

Special pre-presentation meetings with Richard and Gilles (Friday 12/1 on Zoom TBC)

Early oral feedback on business plans.

12. Integrative session: the promises of RE tech (12/05)

Student presentations/pitches: 10 minutes per team

Integration panel: Ron Kravit (Tracker Capital Management) OK/reconfirm and Alec Ellison (Houlihan Lokey)

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 two main texts, *PropTech 101* and *Rethinking Real Estate*. They do not perfectly map into our sessions but we encourage you to read them back-to-back.

Main texts.

- Block, Aaron, and Zach Aarons. 2019. *PropTech 101*. Charleston (SC): Advantage. (It is not available in the bookstore but can be ordered on Amazon easily).

- Poleg, Dror. 2020. *Rethinking Real Estate: A Roadmap to Technology's Impact on the World's Largest Asset Class*. Brooklyn (NY): Palgrave Macmillan. (This is a good book but its organization – asset class by asset class – does not fit well with ours.)

1. Introduction

- *Proptech 101* chapter 1.

- *Rethinking Real Estate* chapters 1 and 22.

- Clayton, Jim, Frank J. Fabozzi, S. Michael Gilibert, Jacques N. Gordon, Youguo Liang, Greg MacKinnon, and Asieh Mansour. 2019. The world's oldest asset class enters the 21st century: How technology is transforming real estate investment. *Journal of Portfolio Management*, 45(7): 14-23.

Shorter readings

- The Most Surprising Proptech Industry Statistics in 2023. Gitnux Market Data.

<https://blog.gitnux.com/proptech-industry-statistics/>

- Roy Riddhiman. What Is Proptech? Trends and Opportunities In 2023

[https://www.selecthub.com/property-](https://www.selecthub.com/property-management/proptech/#:~:text=Digitizing%20every%20aspect%20of%20property,43%25%20of%20the%20housing%20market.)

[management/proptech/#:~:text=Digitizing%20every%20aspect%20of%20property,43%25%20of%20the%20housing%20market.](https://www.selecthub.com/property-management/proptech/#:~:text=Digitizing%20every%20aspect%20of%20property,43%25%20of%20the%20housing%20market.)

McKinsey's view: <https://www.mckinsey.com/industries/real-estate/our-insights/six-new-imperatives-for-real-estate-players>

JLL's view: <https://www.us.jll.com/en/trends-and-insights/research/global/gmp>

- PWC ULI. 2022. *Emerging Trends in Real Estate 2023*. Chapter 1.

<https://www.pwc.com/us/en/industries/financial-services/asset-wealth-management/real-estate/emerging-trends-in-real-estate.html>

2. Business plan

- *Proptech 101* chapters 5 and 6.

- Botelho, Tristan L., Daniel Fehder, and Yael Hochberg. 2021. Innovation-driven entrepreneurship. National Bureau of Economic Research Working paper 28990.

- Sahlman, William A. 1997. How to Write a Great Business Plan. *Harvard Business Review* (July-August), 98-108.

- Handen, Jeff. 2018. How to write the perfect business plan: A comprehensive guide. *Inc.* (July 20).

Rayport, Jeffrey F. , Davide Sola, and Martin Kupp. 2023. The Overlooked Key to a Successful Scale-Up. *Harvard Business Review* (January – February).

- Wharton video (on Canvas): The elevator pitch

- Wharton video (on Canvas): Competitive analysis

- Two investment memos and two business plans to be distributed to read in advance

3. Finance

- *Proptech 101* chapter 2.

- Feld, Brad and Jason Mendelson. 2019. *Venture Deals*. John Wiley and Sons. Hoboken(NJ). Chapter 3.

Background on fintech

- Gai, Keke, Meikang Qiu, and Xiaotong Sun. 2018. A survey on FinTech. *Journal of Network and Computer Applications* 103: 262-273.

Case to prepare

- How blockchain will transform real estate?

4. AI/Data analytics

- *Proptech 101* chapter 2.

- Mollick, Ethan. 2020. *The Unicorn's Shadow*. Philadelphia: Wharton Press. Chapter 2.
- Conway Viriato, Jennifer. 2019. AI and machine learning in real estate investment. *Journal of Portfolio Management*, 45(7): 43-54.

Shorter readings

- Rizzi, Nicholas. 2019. Leaving tracks. *Commercial Observer* (June 25 – July 2). - *The Economist*. The world's most valuable resource is no longer oil, but data. June 20, 2019.
- Kufinski, Yoroslav. 2020. 6 Ways Artificial Intelligence Is Reshaping Real Estate. *Inflexion*. <https://www.iflexion.com/blog/artificial-intelligence-real-estate>
- Dyton, Joe. 2023. 4 ways AI is being used to enhance proptech. *Connected Real Estate Magazine*.
- JLL's take: <https://www.us.jll.com/en/trends-and-insights/research/artificial-intelligence-and-its-implications-for-real-estate>

For the assignment, read

- *Proptech 101* chapter 7.

5. Brokerage and disintermediation

- *Proptech 101* chapters 4 and 5.
- Barwick, Panle Jia and Maisy Wong. 2019. Competition in the Real Estate Brokerage Industry: A Critical Review. The Brookings Institution Publication. <https://www.brookings.edu/wp-content/uploads/2019/12/ES-12.12.19-Barwick-Wong.pdf>

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
- Wharton video (on Canvas): Two-sided markets

Case

- Can Residential Brokerage be Fully Automated?

6. Changes in demand (assets)

- *Rethinking Real Estate* chapters 8-12. (2-7 on retail are also recommended)

- Gupta Arpit, Vrinda Mittal, and Stijn Van Nieuwerburgh. 2022. Work From Home and the Office Real Estate Apocalypse. NBER Working paper 30526.

Shorter readings

- Bloom Nicholas, Paul Mizen, Shivani Taneja. 2021. Returning to the office will be hard. VoxEU CEPR. <https://voxeu.org/article/returning-office-will-be-hard>

- Badger, Emily. 2019. Why Technology Hasn't Fixed the Housing Crisis. *New York Times* (January 29).

- Andrews, Edmund L. 2021. The Pandemic Blew Up the American Office — For Better and Worse. *Insights by Stanford Business*. <https://www.gsb.stanford.edu/insights/pandemic-blew-american-office-better-worse>

- PWC ULI. 2022. *Emerging Trends in Real Estate 2023*. Chapter 2.

<https://www.pwc.com/us/en/industries/financial-services/asset-wealth-management/real-estate/emerging-trends-in-real-estate.html>

For the assignment, read again:

- *Proptech 101* chapter7.

7. Changes in demand (geography)

Changing geography across cities

- Autor David H. 2020. The Faltering Escalator of Urban Opportunity. In: *Securing Our Economic Future*, Melissa S Kearney and Amy Ganz (eds.), 108–36, Aspen Institute.

<https://economics.mit.edu/files/21077>

- PWC ULI. 2021. *Emerging Trends in Real Estate 2022*. Chapters 1 and 2.

Changes within cities

- Ramani, Arjun and Nicholas Bloom. 2021. The Donut Effect of Covid-19 on Cities.

Mimeo, Stanford. https://wfhresearch.com/wp-content/uploads/2021/05/DONUT_MAY21.pdf

- Gupta, Arpit, Vrinda Mittal, Jonas Peeters, and Stijn Van Nieuwerburgh. 2022. Flattening the Curve: Pandemic-Induced Revaluation of Urban Real Estate. Mimeographed. Columbia University.

- Rosenthal, Stuart, William C. Strange, and Joaquin Urrego. 2021. Are City Centers Losing Their Appeal? Commercial Real Estate, Urban Spatial Structure, and COVID-19. *Journal of Urban Economics*.

For the assignment, read again:

- *Proptech 101* chapter7.

Shorter readings

- PWC ULI. 2022. *Emerging Trends in Real Estate 2023*. Chapter 3.

<https://www.pwc.com/us/en/industries/financial-services/asset-wealth-management/real-estate/emerging-trends-in-real-estate.html>

8. Infrastructure

- *Rethinking Real Estate* chapters 17-21.

Case:

- Investing in Micromobility

9. Operations, Single-family rentals

- *Rethinking Real Estate* chapters 13-16.

- Case:

Multifamily asset class

10. ESG

Case:

- The Collision of Real Estate & Climate Tech. The Greatest Disruption in Real Estate History

Short readings:

- Deloitte. 2021. ESG. *The Impact of Social Good on Real Estate*.

- CBRE. 2021. *ESG and Real Estate: The top ten things investors need to know*

11. Construction

- McKinsey and Company. 2020. *The next normal in construction*.

- Ottinger, Eric, Harshit Minglani, and Mark Gibson. 2020. *Technological advancements disrupting the global construction industry*. Ernst & Young LLP

- Goolsbee, Austan and Chad Syverson. 2023. The Strange and Awful Path of Productivity in the U.S. Construction Sector. NBER Working Paper No. 30845.

Case:

- New Technologies in Construction

12. Final presentations

- *Proptech 101* chapters 5 and 6.

- Wharton video (on Canvas): Crafting the business model