



H A R V A R D | B U S I N E S S | S C H O O L

Building Sustainable Cities and Infrastructure

John D. Macomber

Senior Lecturer of Business Administration

Harvard Business School

OVERVIEW

This course looks at pragmatic action in the face of three huge global trends: 1) rapid and massive migration to cities as people seek opportunity (or flee from other problems); 2) current and worsening scarcity of basic resources: not enough clean air, clean water, land, food, energy and too much traffic and garbage; and 3) the apparent inability of federal governments to do much about these issues. What role can the private sector play in using the tools of business to help address some of the world's problems? Where will there be opportunities for investment and entrepreneurship?

The course takes a "cities first" approach because a) cities are often the political unit that can act; b) investments in cities can have a cumulative benefit as they add to each other; and c) investors understand city scale projects: for example a toll road, water processing, or power transmission lines.

The course also takes a "built environment" approach. This is not the only way to understand cities! But it is useful since it looks at components of cities: the physical structures like roads, transit, buildings and more that are needed to support other attributes like jobs, schools, housing, and hospitals.

The five modules build skills in these areas, with consideration of current best practices and of what is coming in the future.

I. Infrastructure Finance and Public Private Partnerships introduces a basic toolkit of large project finance, with particular attention to how to engage private actors in multiple sectors.

II. Buildings in Cities: Development and Construction looks at the basics of how commercial buildings get financed and delivered, and how their deployment impacts the urban fabric.

III. Global Issues and New Tools introduces and raises awareness of concepts and approaches including district scale power, climate change and sea level rise, autonomous vehicles, waste to energy, and public private partnerships in low income housing.

IV. Infrastructure and Economic Development looks at the basics of how investments in roads, power, ports and more are felt to stimulate economic growth, with examples.

V. Megaprojects and Cities brings all of this together with illustrations of how these tools are deployed all over the world.

Cases are drawn 1/3 from the USA, 1/3 from Asia including India, and 1/3 from the rest of the world, notably Latin America and Africa. There are historic cities and new cities. Sectors include roads, rail, power, water, municipal solid waste, commercial real estate, and more.

The workload is substantially reduced from last year (following comments on evaluations). There are however several polls and short papers. Most evenings there will be a case and one other related reading. For students interested in further materials, those will be posted and so identified.

Grading is: 50% class participation, 20% polls and short exercises, 30% final exam. There is no paper or final project.

There will be people from many professional and personal backgrounds in the course. I look forward to meeting and learning from you all!

Module 1: Infrastructure Finance and Public Private Partnerships

January 23, 2017 8:30 AM - [BSCI | Class 1: Trans Milenio](#)

Case: [TransMilenio: The Battle Over Avenida Septima](#) (HKS681)

Presentation: [HBS BSCI First Class and Course Presentation 2017.01.23.pdf](#)

Welcome to "Building Sustainable Cities and Infrastructure!"

This course looks at three large trends of our times: First, massive and rapid urbanization all around the world as millions of people move to cities seeking opportunity; second, current and worsening scarcity of important basic resources like clean air, clean water, energy, and food --along with too much traffic, too much garbage, and too much pollution; and third, while one would hope that well-funded, forward thinking federal governments would invest ahead in consensus driven projects based on data and intended to ameliorate the first two trends, evidently we cannot rely on politicians to make that happen. So what can the private sector do to have positive impact (and make profits)?

We will discuss qualitative aspects of the case for the first half of class today. In the second half we will review the course including themes, objectives, and expectations. For the next class we will continue with Trans Milenio and BRT, looking at the basics of infrastructure and large project finance as the foundation of the toolkit for the course.

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Transit is a major component of a sustainable city since so much fuel (and pollution) are involved; and it is a major component of a competitive city since so much time is involved in moving workers and goods. Transit choices and urban planning and investment choices go hand in hand as the configuration of transit influences size and placement of built structures - and as the size and placement of buildings, schools, and parks influences roads, rail, and other forms of transportation.

The battle over Avenue Septima introduces the points of view and some of the basic analysis with respect to these issues. A common transit discussion involves trade-offs between underground metros and above ground bus rapid transit. We will introduce and examine the urban form and cash flow frameworks for both.

Discussion Questions:

1. How do you assess the impact on urban form of the three main choices: status quo, BRT, MRT? (Urban form is the arrangement of roads, buildings, parks, and other permanent elements).
2. Would BRT or MRT be "better" for economic development of Bogota at the time of the case? Which would be preferable for some concept of "sustainability" (as you define sustainability)?
3. How would your choice be impacted, if at all, by deployment of some of the technologies on the horizon today, for example autonomous vehicles, sensors everywhere, smart phones everywhere, analytics, or "internet of things" connectivity?
4. What are the most important elements of a multiyear financial model to compare BRT and MRT choices?

January 25, 2017 8:30 AM - [BSCI | Class 2: Trans Milenio Financial Model](#)

Case: [TransMilenio: The Battle over Avenida Septima, HKS681](#) (This is the same case as in Monday's class)

[TransMilenio Financial Supplement Jan 2017.xlsx](#) (posted Monday 23 Jan, 4 pm)

[Approach and TransMilenio Social, Environmental, and Economic Impacts of Bus Rapid Transit - EMBARQ.pdf](#)

[BSCI Large Project Finance - Characteristics 2017.01.25.pdf](#) (posted Wed 25 Jan, 11:30 am)

Large Project Finance is a key element of infrastructure finance and of the component approach to looking at sustainable cities. Projects tend to have high capital investment and relatively low but stable long term cash flows. They often are financed independently and not part of the balance sheet of a corporation. In this manner they differ from the corporate finance and financial portfolio investing themes of FIN 1 and FIN 2. We will look at some of the major elements of the cash flow projection.

The TransMilenio Financial Supplement is a simplified projection that was created for discussion purposes, generally drawing on the data from the case. Future cases will have more detailed models.

The leading global NGO "WRI/EMBARQ" has its own methodology for modeling the benefits of BRT and MRT, moving beyond farebox tariffs. We will discuss that approach as well. Don't try to tie out the EMBARQ numbers to the Excel model.

Discussion Questions:

1. What are the key uncertainties in the analysis of BRT and MRT? Are they captured in this model or are some missing?
2. Using the ridership and tariff assumptions in the model, what BRT fare would allow the system to run without an operating subsidy? What MRT fare would allow the system to run without an operating subsidy? Do you think that the elasticity of fares and ridership is appropriately incorporated into this model?
3. If the fares and ridership are held as indicated, who covers the annual operating shortfall?
4. There is more to assessment of benefits than just looking at fares. Do you agree or disagree with the EMBARQ approach?

January 30, 2017 8:30 AM - [BSCI | Class 3: Poland's A2 Motorway](#)

Case: [Poland's A2 Motorway, 202030](#)

Spreadsheet Supplement: [Poland's A2 Motorway, Spreadsheet Supplement, 202733](#)

[Posted Jan 30]: [BSCI slides Poland's A2 Motorway, Classification of Project Risk, WEF PPP preparation.pdf](#)

[Link Jan 30]: [WEF Strategic Information Steps to Prep Public Private Partnerships](#)

Successful infrastructure projects of any type, and with any capital source, depend on a clear understanding of cash flows and clear definition of which entities bear which uncertainties and risks. Road projects are a useful illustration since they typically have a clear primary revenue source (tolls) and since they also have many important uncertainties in conception, delivery, and operation. We will look at Poland's A2 Motorway to explore many of these considerations.

The private finance of public infrastructure (a form of Public Private Partnerships) is referenced repeatedly in discussions of urbanization and emerging economies. Bringing in outside capital by giving a concession to collect rents (or tolls) over a fixed period of time is one way to do so. Beyond the regional development point of view, some aspects of projects are similar in any environment; others change substantially with the situation. Cash flow allocation, the mapping of the players in the supply chain, and the analysis of who bears risk and reward have many similarities even in what may appear to be very dissimilar types of projects.

The A2 Motorway is projected to cost about a billion euros. The Polish government is not in a position to raise and spend this money directly. How can private capital and expertise be mobilized to construct this key artery?

This case looks at elements of regional economic development, emerging country project finance, and the design and construction value chain through the lens of a major roadway initiative in Poland that is hoped to be "our road to the 21st Century".

Discussion Questions:

1. Consider the parties in this project. What is your assessment of the benefits and perils of their capabilities, interrelationships, and motivations?
2. Looking at sources and uses of funds as well as the cash flow projection, do you think risks and rewards are fairly shared?
3. Would you invest along with the equity partners in the equity component of this deal? Why or why not?
4. How can the risks and uncertainties in these plans be categorized, addressed, controlled, or allocated?

January 31, 2017 7:00 AM - [BSCI | Class 4: POLL Poseidon Carlsbad](#)

Assignment

Please complete the poll at the link below. Your responses are due by Tuesday, January 31 at 7:00 am.

Poll Link: [Poseidon Carlsbad Poll](#)

January 31, 2017 8:30 AM - [BSCI | Class 4: Poseidon Carlsbad: Desalination and the San Diego Water Authority](#)

Case: [Poseidon Carlsbad: Desalination and the San Diego County Water Authority, 215057](#)

Article: [The Right Way to Rebuild America's Infrastructure](#)

Poll: [Poseidon Carlsbad Poll](#)

California has a longstanding water shortage, and this has an impact on quality of life and on the economy in the city of San Diego. Poseidon Water is a private company proposing to fund, develop, and operate a seawater desalination plant to provide potable water.

While this situation is set in California, the main issues, approaches, and frameworks can be applied to cities and infrastructure all over the world.

Required Poll: Please submit your answers to the [poll](#) by 7 am on January 31, 2017 at the latest.

Discussion questions:

1. When is seawater desalination good public policy? What is your analysis of the other choices available to the San Diego County Water Authority?
2. Would the proposed investment be attractive to a private equity firm like Blackstone or Carlyle, based on the information in the case? Why or why not?
3. What is your assessment of how Poseidon and SDWCA have allocated the uncertainties of the project? How does this compare to the allocation in Poland's A2 Motorway? How is a transit project different from or the same as a water project?
4. How should Brian Brady vote?

February 6, 2017 8:30 AM - [BSCI | Class 5: Mexico City Water Shortage](#)

Case: [Mexico City Water Shortage \(212-044\)](#)

Spreadsheet Supplement: [Mexico City Water Shortage, Spreadsheet Supplement](#)

Further Reading: [Charting Our Water Future \(Exec Summary\)](#)

[Slides from class, posted Feb 6]: [Mexico City Water Slides](#)

Mexico City, a great world capital, has plentiful rainwater, experiences regular and severe flooding, and still has an intense and perpetual shortage of clean water for its inhabitants.

How did this situation come to be and what can be done about it? What frameworks and concepts from this situation can be extended to other continents, other forms of infrastructure, other planning tools, and other investments?

Discussion Questions:

1. What is the engineering solution to Mexico City's water shortage and flooding problems?
2. What is the general financial configuration to support the engineering solution?
3. Is this a good public-private partnership opportunity for GDF Suez?
4. How should urban planners think about water going forward? Where will there be opportunities for private capital and operations? Where do you see innovation in water?

February 7, 2017 8:30 AM - [BSCI | Class 6: The Olmos Project: Value Creation and Value Capture](#)

(Updated Feb 1, 2017)

Case: [The Olmos Project: Value Creation and Value Capture](#)

Exhibit 10: [Olmos Financial Model 2017.01.31.xlsx](#)

The Lambayeque region of Peru needs large scale irrigation infrastructure, but does not have the cash to pay for the project. Alfonso Pinillos needs to decide whether his firm can fund the irrigation infrastructure by acquiring land at a pre-irrigation price then selling it at a post-irrigation price. Value is created by the installation of the irrigation; value is realized in the land sale; and value is captured and distributed in this instance by the arrangement between the regional government and Pinillos' company. We will use this case to look at the basics of how this value is captured and distributed in agricultural land, before moving on to consider value creation, value realization, and value capture in a more complicated, and more typical, city setting: urban transportation and real estate.

Discussion Questions:

1. Consider the money. As presented in Ex 10, is this a good deal for Odebrecht?
2. What are the major risks in the project? Who bears them? Is this a fair allocation?
3. What have ProInversion and the government of Lambayeque done well in setting up this project? What have they done poorly?
4. Is this project a one-off or is the methodology reproducible in other infrastructure sectors (like transit or power) or other geographic regions (in Peru or elsewhere)? If so, under what conditions?
5. As portrayed, is this project good public policy or is it corporate welfare?
6. Should Pinillos continue with the project as proposed, or walk away from the deal?

February 13, 2017 8:30 AM - [BSCI | Class 7: Extending the Green Line to Somerville](#)

(Revised Feb 9, 2017)

Case: [Extending the Green Line to Somerville](#)

MBTA Budget: [MBTA Mass Bay Transit Authority Budget FY 2015](#)

City of Somerville Budget Summary: [Somerville Budget Summary FY 2017 \(excerpt\)](#)

Worksheet: [Extending the Green Line to Somerville Financial Supplement](#) (Note that this is a new model and may have formula errors).

Optional further reference:

Massachusetts Transit Oriented Development: [Transit Oriented Development - Massachusetts Smart Growth Smart Energy](#)

[Transportation Revenue Options- Infrastructure, Emissions, and Congestion](#)

[Transportation Land Valuation - Victoria Transport Policy Institute](#)

Discussion Questions:

Massachusetts governors including Volpe, Sargent, Dukakis, Romney, Patrick and Baker have all struggled with finding funds to build the Green Line Extension to Somerville. The MBTA is also an unlikely source since that entity has its own financial challenges, as does the Commonwealth of Massachusetts.

We will use this case to build on the concepts from the Olmos situation of: Value Creation, Value Realization, and Value Capture. Could there be enough value created from real estate and jobs to fully pay for the capital cost for the Green Line Extension?

1. Do you agree or disagree with the categories and magnitude of benefits of the Green Line Extension as expressed in the case?
2. What the long term answer to the MBTA financial predicament is as described in its financials (notably Appendix B, the revenue and expenses statement)?
3. Consider the several scenarios described in the case regarding population, housing units, and jobs. These include a no-build version, the MAPC version described on P. 12 and in the exhibits, and the more aggressive MetroFuture and SomerVision (Fig. 12) concepts. Assume the SomerVision and more aggressive scenarios can only occur if the Green Line Extension is built. Based on the stated median housing value, the median per capita income, and a commercial real estate value of \$200/sf, how much incremental value is created in the SomerVision scenario as compared to the MetFuture scenario? As a thought exercise and in theory, if this value were created, realized, and captured by the public (to build transit) is it enough to pay for the capital costs of the Green Line extension? Please refer to the "Extending the Green Line to Somerville Financial Supplement" for input value and other key assumptions to use.
4. Consider a "more density" scenario and assume adequate demand for 25% more new commercial SF, jobs, and housing units than in the SomerVision concept. Speculate also that both housing values and median wages would increase an additional 25% thanks to the existence of the Extension. Now is enough value created to pay for 100% of the capital costs of the Green Line Extension?

5. Would real estate investors agree to this degree of value capture? Would the "more density" scenario be good public policy? Why or why not? (You may also want to refer to the Transit Oriented Development - Massachusetts Smart Growth document).

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Looking Ahead: There is an online poll due before class tomorrow Feb 14th. See Canvas for Feb 14th.

Module 2: Buildings in Cities; Development and Construction

February 14, 2017 7:00 AM - [BSCI | Class 8: POLL Back to School](#)

Assignment

Please complete the poll at the link below. Your responses are due by Tuesday, February 14 at 7:00 am. The assignment is worth 3 points.

Poll Link: [Back to School Poll](#)

February 14, 2017 8:30 AM - [BSCI | Class 8: Back to School: Real Estate Development of Off-Campus Student Housing](#)

(Revised Feb 10, 2017)

POLL due the morning of class, February 14th, 7:00 am (3 points). You may work alone or with one or two classmates to consider the poll, but please post your own responses individually.

Case: [Back to School: Real Estate Development of Off-Campus Student Housing](#)

Poll: [Back to School Poll](#) (due Feb. 14 by 7:00 am)

[Posted Feb 14 after class]:

Back of Envelope Setup; Stress Test: [Back to School Setup](#)

DCF Multiyear proforma: [Back to School Off Campus Housing DCF](#)

Cap Rate spreads presentation: [Cap Rate Spreads](#)

This case opens Module 2, "Buildings in Cities: Development and Construction." The objectives of the module are:

a) to become familiar with buildings, particularly commercial real estate, as important components that shape cities in addition to hard infrastructure like the roads, buses, rail, and water we have looked at to date; and

b) to practice some of the techniques of development and project delivery that apply to both buildings (vertical construction) and infrastructure (horizontal construction).

We will use this case to introduce basic elements in analysis and execution of real estate development projects. Many students in the course have no exposure to real estate finance; others are veterans of the industry or of other HBS, GSD, and HKS classes in real estate. We will work to balance input and learning from both sets of experience in this case discussion.

Kimberly Slater and Christopher Lenard are evaluating a development opportunity in Madison, Wisconsin. How should they approach the analysis? Is this a good opportunity on a "back of envelope" basis, worthy of further evaluation?

This case contains enough information to consider phasing and time to build and to lease up, to develop a proper discounted cash flow (DCF) for detailed analysis, to conduct a bank lending style stress test, and even to discuss pricing of real options -- but we will not build those models today. They will be shared in class if time permits.

Discussion Questions:

1. What is your assessment of the Slater and Lenard team and their suitability for this project? What is your assessment of the market and the broader Madison economic and social environment? What is your evaluation of the project design program?
2. What are the strengths and weaknesses of the apartment layouts? Could they be improved at reasonable cost?
3. Exhibits 16 and 17 put forth data for an initial feasibility evaluation. A "back of envelope" analysis is essentially a simple snapshot of one stabilized year's cash flow and debt service which can be done with a few numbers and a four-function calculator. The attractiveness of the deal can be assessed in light of cash flows and their relation to project cost and required equity. If Slater and Lenard can acquire the site for \$1.1mm (p. 6), and borrow 75% of the project cost (p. 6), what are the "back of envelope" yields to cost and to equity? (To translate to HBS real estate nomenclature, real estate Net Operating Income (NOI) in the case would be HBS Cash Flow from Operations (CFO). CFAF is HBS nomenclature for Cash Flow after Financing. These two can be compared to total project cost and to equity). (The [mortgage constant](#) for an interest rate of 4.625% [P. 6] with 25 year amortization is 6.755% ([chart](#)). Use *project cost* to calculate the initial loan amount, not the "supportable" calculation methodology used in Exhibit 17).
4. Do these ratios compare favorably or unfavorably with the cost of debt on P. 6, the Near-Campus sales prices in Exhibit 10, and the Near-Campus Cap Rates in Exhibit 11? (The Capitalization Rate in this context is a ratio derived from NOI (CFO) of a rental unit divided by cost of the unit. A unit with annual NOI (CFO) of \$36,000 that was built for \$500,000 would have been built to a development "cap rate" of 7.2%).
5. Compare to the Somerville situation. If Madison were to install fast and efficient public transit to serve farther-away suburbs, would you expect the value of the subject property to increase or to decrease?

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[POLL](#) due 7 am, Tuesday Feb 14th. 3 points.

You may work alone or with one or two classmates to consider the poll, but please post your own responses individually.

February 14, 2017 3:30 PM - [BSCI | OPTIONAL Financial Review Session](#)

We will have an OPTIONAL financial review session on Tuesday, February 14th, 3:30 - 4:30 pm, in Aldrich 207 (our regular classroom).

February 15, 2017 8:30 AM - [BSCI | Class 9: Urbi and the City Licensee Managers](#)

Case: [Urbi and the City Licensee Managers A \(209144\)](#)

URBI is one of the largest homebuilders in Mexico. In late 2008 Selene Avalos must decide which of three finalists she will vote for as the last City Licensee Manager (CLM) for this year. To make her decision, she needs to consider the qualifications of the CLM candidates, the circumstances of the “land partner” in each city, the design and layout of each project, and the numbers for each project. In addition to those thoughts, Selene and the team also have to consider URBI’s overall strategy in the housing market in Mexico, and how best to match CLMs with URBI’s skills in the Home Production Line and in the Client Production Line.

We will use this case to explore a number of topics, including: competitive strategy in service businesses; issues and opportunities in urbanization in emerging markets; and opportunities to serve low income “bottom of the pyramid” clients while utilizing market based approaches with technological assistance. There will be a short "B" case with a recent events update.

Discussion Questions:

1. What are the most important assets of the **Home Production Line**? Which of the CLM and LP combinations would best take advantage of these assets? Why?
2. What are the most important advantages of the **Client Production Line**? Which of the CLM and LP combinations would be the best match for URBI’s facilities? Why?
3. With the City Licensee Manager program, what does URBI do strategically? What does URBI *not* do?
4. The City Licensee Manager concept is relatively new to URBI. What aspects do you like about the program? What could go wrong?

February 21, 2017 8:30 AM - [BSCI | Class 10: StarNight Hotel Construction Bid: Real Time Competition on Schedule, Scope, and Cost](#)

(Slightly updated Feb 19, 2017)

Case: [The StarNight Hotel Construction Bid: Real Time Competition on Schedule, Scope, and Cost \(209067\)](#)

Background Reading: [You Can Manage Construction Risks](#)

[Posted Feb 21 after class]: [StarNight Construction Bid Sim Bid Breakdowns BSCI](#)

[Posted Feb 21 after class]: [Real Estate and Construction Value Chain for Hotel](#)

[Posted Feb 27 after Bid Sim Debrief]: [Bid Sim Analysis BSCI 2017.02.21.xlsx](#)

Please bring your laptop or full size tablet to class. After you receive your team assignments, you may then decide whose device to use for the team during the simulation. A physical keyboard is helpful. You will need to be on one of the HBS WI-FI networks. (There will be 25 teams of 4 students each).

While few HBS students will become general contractors, most of you will be involved in purchasing construction services as real estate developers, school or hospital trustees, corporate users of office space, or promoters of water, energy, or transit projects.

This class is a live, multi-team, scored and graded (3 points), group simulation of assembling and submitting a competitive general contractor construction bid. Grading criteria will include completeness and competitiveness of bids.

The simulation debrief will of course include analysis of "who wins?" and "why?" and further discussion of the process. Learning objectives include: describing the "construction industry value added system," evaluating characteristics of major building components, completing a quantity survey, assessing subcontractor bid dynamics, making tradeoffs to optimize cost, time and scope, and determining how aggressively to set project level profit margins.

Students will be assigned to teams at the beginning of class. Each team will then be assigned a specific company role ("Local," "Regional," or "National") and receive final simulation instructions in class.

You will want to perform a quantity survey and calculate the quantities of important materials in the building design. Before the simulation starts, your team may want to discuss baseline choices for foundation, structure, skin, and profit margin as well as the client's selection criteria. These strategies of course may evolve as market pricing emerges during the final stages of the bid. You should also review the Construction Bid Sim User Guide.

During the bidding process, subcontractors in the various trades will submit a series of bids. The prices and durations in these subcontractor trade bids may change as the deadline gets closer. Your team will have to select and enter a valid subcontractor bid, click on your preferred permutation of building elements, and post a profit margin all by the bid deadline (when the clock runs down to zero). The winning teams will be determined during the debrief portion of the class. You might want to ponder how the owner will value the bids - Cheapest? Fastest? Some ratio of best "value" of cost to area?

The StarNight Hotel is being built in a city in Brazil. We will run the competition using the metric system of measurement and denominated in Brazilian Reals (BRL). At the time of the case the exchange rate was 2:1 BRL to USD (today it is closer to 3:1)

For a general sense of the price ranges, the following unit prices can be used to draft initial estimates going into the bidding. Before the simulation begins, you will have to enter your own quantity survey information since most of the subcontractor bids come as unit prices to multiply against your quantities. As the simulation progresses, the subcontractor bid process will uncover the true market prices and may supersede some of these initial estimates.

Item	Unit of Measure	Unit Price	Time
Cut & Cover Foundation	One of these	BRL 6,200,000	7 months
OR Up/Down Foundation	One of these	BRL 7,800,000	4 months
Steel Structure	Metric Tons	BRL 4,750 / ton	2 months
OR Concrete Structure	Cubic Meters	BRL 350 / m ³	4 months
Glass & Aluminum Skin	Contact Square Meters	BRL 920 / m ²	2 months
OR Brick Skin	Contact Square Meters	BRL 800 / m ²	1 month
Windows (only if brick skin)	Each	BRL 1,600 Each	1 month
All other costs	Approximately	BRL 32,000,000	4 months

February 22, 2017 8:30 AM - [BSCI | Class 11: Arge Construction Company](#)

(Updated Feb 19, 2017)

Case: [Arge Construction Company](#)

Arge Construction Company is a new spinoff of an old line family business in Turkey. Arge is faced with a number of questions around what markets to pursue and what services to provide. Some of the opportunities are similar to the housing market in the Back to School (Madison, WI student housing) case, some similar to the Urbi emerging market opportunity, and some more like the StarNight Hotel general contractor bid. We will use this case to explore the project delivery process looking at of the value-added system, and markets and roles of firms in that system.

Discussion Questions:

1. What are the key aspects of a SWOT (strengths, weaknesses, opportunities, threats) analysis of Arge at the time of the case?
2. How do you map the main market selection and segmentation choices that Arge faces? These probably include dimensions like: What countries? What product types? What client types? What services to provide? Are there other important dimensions to ponder?
3. Consider the Industry Value Added System and who the main players might be in developing and delivery a shopping mall in Romania. What roles could Arge fulfill?
4. Do you agree with the Five Forces analysis in Exhibit 8? What does it tell you?
5. What would a Five Forces analysis suggest regarding the attractiveness of the described industry segment opportunities in Iraq and Turkey?
6. What should Emrah Ergelen do?

Module 3: Global Issues and New Tools

February 28, 2017 8:30 AM - [BSCI | Class 13: CrossBoundary Energy](#)

(Revised February 23, 2017)

Case: [CrossBoundary Energy Tanzania](#)

Spreadsheet: [CBE Exhibit 8 Solar Economics Breakdown.xlsx](#)

Article: [Building Sustainable Cities](#)

Optional Op-Ed: [What Africa Can Teach America about Funding a Good Infrastructure Plan](#)

Introduction:

CrossBoundary Energy was founded by HBS MBAs with the objective of facilitating engineering, finance, and project delivery to provide cost effective, renewable energy solutions in Africa. The case combines issues from the first module of the course (infrastructure and project finance) with issues from the second module (project delivery and firm strategy in the development and construction value added system). We will use this material to combine concepts from those two modules -- and bridge to the third module in the course, Global Issues and New Tools.

This material was originally written to introduce Tanzania. We will consider Tanzania briefly then extend the discussion to country and customer sector selection more broadly.

Discussion Questions:

1. Under what circumstances would it be attractive for a potential client organization to contract for power with CBE and its affiliates? What would be the objections to doing so, and as CBE how would you overcome those objections?
2. What is the best role for CBE to play in the power finance and delivery value added system? Why?
3. What would characterize the best nations, customer types, and corporate customer industries for CBE to pursue? Is Tanzania one of them? (The appendices may be useful in supplementing sector, continent, and nation information in the main text).
4. Consider Exhibit 8, CBE Solar Economics Breakdown. How does this framework support your positions above?
5. The article, "Building Sustainable Cities" proposes an efficiency matrix that combines technological advances with financial sophistication. Does the CBE business model cross that frontier? Is the business model defensible and scalable?

March 6, 2017 7:00 AM - [BSCI | Class 14: POLL Miami-Dade County and Sea Level Rise](#)

Assignment

Please complete the poll at the link below. Your responses are due by Monday, March 6 at 7:00 am. The assignment is worth 2 points.

Poll Link: [Miami-Dade and the Sea Level Rise Poll](#)

March 6, 2017 8:30 AM - [BSCI | Class 14: Miami-Dade County and Sea Level Rise](#)

(Financial Model logic revised slightly Sunday March 5, 2016 am. Poll answers should not be substantially different. The poll is time stamped, so any differences can be reconciled).

Note POLL due Monday morning March 6th, 7:00 am - 2 points

Case: [Miami-Dade County and Sea Level Rise](#)

Poll: [Miami-Dade County and Sea Level Rise Poll](#)

Short reading: [Seven Strategies for Managing Sea Level Rise](#)

Short reading: [Seas Rise but Florida Keeps Building on the Coast](#)

Financial Supplement: (Rev 3/5/2016 10 am see note above) [Miami Dade Sea Level Investment Financial Supplement 2017.03.05.10.xlsx](#)

Supplemental Insurance Graphics (for today and tomorrow) [Miami Travelers Insurance Supplement](#)

This week we will investigate two very different aspects of highly uncertain futures for cities all around the world: Natural disaster risk including potential sea level rise, and the advent of autonomous vehicles. Since the impacts of both of these phenomena are large and not well understood, there is not yet a body of “best practices.” The cases may seem more conceptual in nature and the discussions may not be as anchored as in a stand-alone water or transit infrastructure project. But the implications are colossal. The intent this week is to provide some context, a sense of order of magnitude, a look at points of view from multiple vantage points, and some basic frameworks to start an analysis. It’s hoped that together we can develop useful approaches from investment, entrepreneurial, and policy angles.

In April of 2013, Miami-Dade County mayor Carlos Gimenez has to recommend a course of action regarding three wastewater treatment plants. The county has compliance problems with respect to existing environmental issues and they also have potential new problems from possible sea level rise and uncertain natural disaster events. We will simplify the discussion to concentrate on the benefit-cost analysis of a few of the scenarios, looking particularly at “who pays” and “when?”

Note that the case only discusses three municipally owned assets. We will also touch impacts and responses with respect to private property.

Tomorrow’s case looks more deeply at the insurance industry in particular, since it’s a major source of finance and also historically has been a vehicle for community protection of people and assets.

Please refer to the Miami-Dade Sea Level Financial Supplement for simplifying assumptions and a rudimentary risk model.

Discussion Questions:

1. The case contains a discussion of the potential to invest in improving an asset that might then be wasted either because fast rates of sea level rise will put the plant in the middle of the ocean, or because population flight will eliminate the need for the facility. How should Giminez approach the decision to invest in climate resilience *today* (or not) in the face of those uncertainties?
2. Please refer to the Miami-Dade Sea Level Financial Supplement. In the A: One-Year, No Insurance, Do Nothing investment choice, there is high total cost exposure in the event of a natural disaster climate event (storm surge, hurricane, flooding). The event is unlikely to occur. But if it does occur, who pays the recovery costs?
3. In the D: Multi-Year, With Insurance, Do Nothing (and Buy Insurance) choice, who pays the insurance premiums? Who pays for the recovery costs if there is an event? Is this the optimum route for the County from an expected value point of view?
4. The reading, “Strategies for Managing Sea Level Rise” suggests approaches. There are parallels in the “Seas Rising but Florida Keeps Building” piece. Broadly the strategies can be put into four buckets: Rebuild, Reinforce, Restrict, Retreat. The status quo default is “do nothing.” How should Mayor Giminez look at public and private property in Miami-Dade County in terms of which strategy fits which land parcel now and in the future?
5. In the United States, the federal government (e.g. the taxpayers) has historically spent generously on a) public construction for flood control, b) subsidies for property insurance in areas where private insurance found it too risky to write coverage, and c) rapid and lightly questioned federal disaster relief appropriations, for example post Katrina and post Sandy. Each of these programs costs tens of billions of dollars annually (the allocation for Sandy alone exceeded \$60bn for one event). Do you expect congressional enthusiasm for federal spending to be maintained or to increase along with the increase in exposures if the combination of sea level rise, migration to cities, and coastal development all continue?
6. How should governments and investors in poorer countries like Senegal, Bangladesh or the Philippines plan for sea level rise?

Note POLL due Monday morning March 6th, 7:00 am - 2 points

March 7, 2017 8:30 AM - [BSCI | Class 15: Travelers Insurance: Focusing on Climate Change and Natural Disaster Risk](#)

Case: [Travelers Insurance: Focusing on Climate Change and Natural Disaster Risk](#)

Optional Info: [Travelers - Financial Statements](#)

Many people consider insurance to be an important element of the toolkit to address potential sea level rise and other perils. In part this is because it's a very large pool of capital. In part this could be because the transparent pricing of risks, and the related impact on size of premiums or even ability to purchase insurance, could beneficially influence behaviors of investors, governments, and individuals alike with respect to measures to reduce vulnerability to natural catastrophes (nat cats) like hurricanes and human-caused catastrophes (man cats) like terrorist events or pandemics.

We will look at this more deeply today in several parts. First, we will consider how a major insurance carrier, The Travelers, looks at climate change and impacts on its business. This includes specialized risk products like "catastrophe bonds" or weather-linked securities. Second, we'll have a high level overview of the state of the art in assessing natural disaster risks on a municipal level: Climate-Ready Boston.

Discussion Questions:

1. The case presents Travelers' "Options for Responding to Climate Change." Principal among these are: Catastrophe Bonds; Risk Model Adjustments; Rate Increases; Withdrawing from Risky Regions; Influencing Behavior ("relieving risk at the source") and a combination of developing new insurance product offerings, direct investment in other companies, and R&D partnerships. How would you rank these options in terms of where CEO Jay Fishman should allocate his time and effort? Why?
2. If property-casualty insurers like Travelers withdraw from what they perceive as high-risk coastal markets, how would this impact property values?
3. Neighborhoods can be considered in terms of natural disaster -- or slow moving climate exposure -- and also current financial value of vulnerable assets. What happens to areas with high exposure but lower financial value and lower ability to pay for insurance, strengthen houses, or sell and relocate?
4. Consider the time frame for possible sea level rise, the low probability of individual natural catastrophes, and varying investment horizons. What actions should be taken now by: Homeowners? Commercial property investors? Owner-occupiers of non-commercial properties like hospitals, universities, transit assets, and municipalities?

[Climate Ready Boston](#)

Guest: [Jason Hellendrung, Sasaki Associates](#)

1. What do you think of the Climate Ready Boston plan?
2. Who benefits? When? Who pays? When?

Value Capture and Infrastructure Bonds in TOD

Guest: John Markowitz, [Mass Development](#) (was not available for the Somerville case)

Optional deeper info for later reference: [MassDevelopment Infrastructure Financing Programs](#)

March 8, 2017 8:30 AM - [BSCI | Class 16: Disruption in Detroit: Ford, Silicon Valley, and Beyond](#)

Case: [Disruption in Detroit: Ford, Silicon Valley, and Beyond](#)

Reading: [The 4 Types of Cities and How to Prepare Them for the Future](#)

Discussion Questions:

1. What are the key ways in which consumers' automotive preferences are changing?
2. What is your assessment of the significance of new entrants and their technologies?
3. What should be the priority for Ford's research and development initiatives?
4. Thinking beyond the constraints of the case, what are the implications for urban form as autonomous vehicles gain wide acceptance and adoption?
5. Cities are not all alike (consider the Four Types of Cities reading and other possible criteria). How should policy makers and investors in different city settings think about autonomous vehicles?

March 20, 2017 8:30 AM - [BSCI | Class 17: Sarvajal: Water for All](#)

Case: [Sarvajal: Water for All](#)

A common model for distributing necessities like potable water and usable power is via central facilities financed through large scale infrastructure measures. These often have major financial, engineering, and design obstacles. Another way to approach the problem (and opportunity) could be to establish neighborhood-scale utilities, for example in potable water, waste water, energy, and zone or cluster heating and cooling.

Many small scale initiatives founder when trying to expand a financial and distribution model beyond the pilot stage. Sarvajal is attempting to make neighborhood-scale potable water a successful entrepreneurial business through a combination of technological innovation, a franchise model on the customer facing side, and an off-balance-sheet leasing model on the capital assembly side.

We will discuss some of the basic technologies of the provision of drinking water, the risks and opportunities of this business model, and the chances to expand the concept if successful.

Discussion Questions:

1. What should Anand Shah do about the problem installation in Vasai?
2. What are the strengths and weaknesses of the Sarvajal business model? How big can it get?
3. As Anand Shah, are you in favor of the leasing model or opposed to it? Why? As a leasing company, would you extend credit to Sarvajal (in the form of leases)? Would it be expensive? How expensive?
4. From a venture capital/private equity point of view, what is the exit/liquidity opportunity?
5. What other services in addition to water could adopt this business model if it proves successful?

March 21, 2017 8:30 AM - [BSCI | Class 18: Sound Group China: Urban Waste Entrepreneurs](#)

Case: [Sound Group China: Urban Waste Entrepreneurs](#)

The infrastructure of enduring, competitive cities includes the collection and treatment of solid waste from households and businesses. The principal choices open by cities are incineration, landfill, or re-use. All of these solutions have political and technical issues.

Sound Group is an entrepreneurial organization founded by Chinese engineers. The company has extensive expertise in water purification and distribution as well as waste water treatment. Handling of municipal solid waste is a new area of endeavor.

Beijing produces about 160,000 tons of household solid waste per day. The Asuwei plant can process about 1/10 of this at present. The company competes with SOEs (State Owned Enterprises) for many contracts including BOT (build operate transfer) and PPP (public private partnership) agreements.

We will use this case to explore the basic technologies of waste-to-food as well as the entrepreneurial and competitive aspects of the finance, tender, and concessions process in this area of service which is critical to the long term health of cities.

Discussion Questions:

1. Is the Asuwei integrated composting facility a good economic deal for Sound Group? What conditions have to be met for it to be a good economic deal?
2. Should Wen Yibo and Sound Group expand into the incineration and power generation business? Under what circumstances?
3. How do the economics of integration/composting and incineration/power compare?
4. What would you recommend to policy makers in this or other city governments with respect to working with the private sector for handling of household solid waste?

March 27, 2017 8:30 AM - [BSCI | Class 19: Dharavi: Developing Asia's Largest Slum](#)

Case: [Dharavi: Developing Asia's Largest Slum](#)

Short reading: [What is Appropriate Density?](#)

Many of the classes leading up to today have considered public-private partnerships in the provision of basic infrastructure like water and transit. Today we will look at applying the same tools to the provision of housing at scale. Housing of course also depends on basic infrastructure like water, electricity, and transit.

The population of cities is anticipated to increase by three billion people by 2050. Many of them will live in informal housing (slums). Cities of the future will have to cope with this fact. Sustainability, in the sense of both environment and also the ability to be robust and enduring, hinges on managing informal housing and the undocumented workforce.

This case looks at the situation in Dharavi, a huge slum in Mumbai, India, which is home to more than 700,000 people. The Maharashtra state government is interested in using the public/private partnership model to improve housing in this massive project.

At pro-forma, the scheme could lead to the provision of over 50,000 housing units for slum dwellers at no cost to them. The scheme also projects a developer profit of 25 billion rupees (about \$500 million USD) and no cash investment by the Government.

The case explores the bid choices - and deal considerations - of one of the competing developers. We then look at extending the model.

Discussion Questions:

1. If Hollen and his firm are successful in this bid, is this the start of a defensible and scalable corporate strategy to deliver more projects like this?
2. As Rance Hollen, would you a) bid a premium more than 10% over the Government's "bidder's premium" of 450 rupees/SF (Exhibit 5c); b) meet the Government's "bidder's premium"; or c) decline to compete?
3. What can the government do to make the project more attractive to private capital? As Hollen, what terms and conditions would you request from the government in order to mitigate your risks?
4. Is this plan good social policy?
5. From an urban design point of view, is the addition of more housing units in the same acreage an improvement or a worsening in terms of density and livability?
6. Is this plan a replicable model for the provision of slum housing in other cities in the world?

Module 4: Infrastructure and Economic Development

March 28, 2017 8:30 AM - [BSCI: Class 20: Jababeka's Foray into Infrastructure](#)

Modified March 22, 2017

Note: There is a short paper due prior to this class (instructions below)

Case: [Filling Institutional Voids in Indonesia: Jababeka's Foray into Infrastructure](#)

Spreadsheet: Speculative Jababeka Financial Model

This case is the first in the fourth module of the course, "Infrastructure and Economic Development." We will be seeking to combine and deploy the tools of the first three modules and consider how they come together (or not) to support growth of communities and societies.

The private finance of public infrastructure is thought to have a lot of potential in both developed economies and in emerging markets. We have been looking at infrastructure and PPP from several angles. In this case, we will extend the analysis to both power and ports - from the point of view of a local operating business trying to diversify into new business lines.

Discussion Questions:

1. Consider the Bekasi Power project. What are the pros and cons of private power generation in developing economies? What are the main uncertainties in the Bekasi Power arrangement and who bears them?
2. Consider the Cikarang Dry Port. What impact does a dry port have on a metropolitan area? Consider the physical and spatial aspects as well as traffic and economic opportunity. What are the main uncertainties in the Cikarang Dry Port arrangement and who bears them?
3. What should S. D. Darmono and PT Jababeka do next on these two projects?
4. Are there generalizable lessons to be drawn from your responses?
5. Should Darmono be considering any of the tools or issues of the module just concluded, for example autonomous vehicles, off-grid electricity, low-income housing, or sea level rise? If so, when and how?

WRITTEN ASSIGNMENT (4 points)

Due: 8:30 am Tuesday, March 28th (the morning of this class)

TEAMS: Not more than three people, of your choosing (can also be solo or two).

LENGTH AND FORMAT: Not more than three pages. Not less than 10 point font. Bullet points, financials, drawings, charts graphics, or sentences & paragraphs all ok as you see fit. You will have to decide what the key points are and how to express them.

MECHANICS: PDF is preferred. *One* person upload for the team, to today's entry in Canvas. Make sure to show all the team members' names.

TOOLKIT: This is a good opportunity to revisit the tools of the first three modules and select one or two that seem useful to illustrate Darmono's choices.

NUMBERS: You may use the attached financial model if you like. The assignment can also be addressed qualitatively. In terms of time allocation, think hard about the frameworks and tools of the course. The point is not to be searching for more information about Indonesia or to wholly re-build the financial model.

WRITTEN ASSIGNMENT:

- Should S. D. Darmono abandon both projects, proceed with both projects, or proceed with just one?
- Why?
- What are the key considerations for Darmono in implementing your recommendation(s)?

April 3, 2017 8:30 AM - [BSCI | Class 21: Pittsburgh](#)

Case: [Pittsburgh](#)

Pursuing sustainability, competitiveness, and vitality demands different approaches in existing, slow growth, developed economies like the US (and in cities like Detroit, Pittsburgh, or St. Louis) than in new build, fast growth, emerging situations like Sao Paolo, Lagos, or Dhaka. What tools are available and what obstacles exist? Where are the opportunities for businesses and investors?

Discussion Questions:

1. How did Pittsburgh come to be aligned around what needed to be done?
2. What was effective in steering business and institutions on this path? What was not effective?
3. What were the benefits and drawbacks of anointing industries to nourish and industries and localities to prune?
4. Should the city leadership embrace fracking as the driving economic activity of the future or should they resist it?

April 4, 2017 8:30 AM - [BSCI | Class 22: Hudson Yards: The Other Side of the Tracks](#)

Case: [Hudson Yards: The Other Side of the Tracks](#)

Reading (P. 3-7, 10-18, Figures 5-11). The rest of this long piece is optional: [Clusters and Competition: New Agendas](#)

The first portion of the class will consider the Hudson Yards situation. The second portion will be an interactive discussion about selection of contract types for infrastructure, real estate, and large project finance, operations, and delivery.

This case is set in May, 2008 in the depths of the US Financial Crisis. Steve Ross of Related has to decide whether to step into another developer's place and make huge bets on construction commitments and development rights, given the situation in New York and the USA at the time.

In 2008, Hudson Yards was a proposed air rights project over 26 acres of rail yards on the western edge of Manhattan. In the early part of the 21st century, the New York Jets had attempted to build a new football stadium and convention center on the site as part of New York City's bid for the Summer Olympic Games in 2012. The games eventually were awarded to London and the stadium was built in New Jersey.

Subsequently, a major agreement was reached to develop office, retail, and housing on the site. That agreement also fell apart and that developer exited the arrangement with the city in early 2008. In May of 2008, the awarding authority offered The Related Companies the opportunity to step into the deal for the same terms. Related had to decide almost overnight whether to accept the deal.

Considerations around go/no go and around pricing included but were not limited to the technical issues of building on top of an active rail yard, the cost of the deck above the rail yard, the phasing, cost, and design of the buildings, whether the location was too far from other key areas of Manhattan, and whether a "community" could ever be created that would justify the rents that would make the project successful in the long run.

This situation is unfolding even today. We will discuss the go/no go/ terms aspects of the 2008 decision point; consider the going-forward design, development, and construction challenges; and consider the range of possible outcomes on the revenue side.

Discussion Questions

1. What are the major uncertainties in the proposed deal and in the financial projection? How would you mitigate them if you were to proceed?
2. Are the air rights agreement and cost of the deck a good investment for Related based on comparable market land values?
3. What would be your most important criteria in considering phasing? What would be your recommended phasing plan?
4. The potential pioneer anchor office tenant has financial demands and also architectural demands that are unusual for one tenant in a multi-tenant building. Where would you draw the line with respect to accommodating Coach?
5. No other developers were willing to step into this huge project at the depths of the financial crises. Why would Related even consider it? Does Steve Ross see something that others do not see? Or does he think he can deliver something that others cannot deliver?

April 10, 2017 8:30 AM - [BSCI | Class 23: Masdar and Tianjin: Eco-Cities](#)

Case: [Masdar and Tianjin: Eco-Cities](#)

Reading: [The 4 Types of Cities and How to Prepare Them for the Future](#)

There is a lot of buzz and interest around eco-cities, zero-carbon cities, green cities, and sustainable cities. Many urban agglomerations claim to be eco or green. Similarly, securities are starting to be listed as "green" or "climate" bonds. We will discuss both.

The definition of a "sustainable city" is of course always in flux. We will tackle this challenge again. The range of interventions varies significantly with point of view; we will look at this from several angles. Market selection matters a lot for investors and corporations, and we will seek to refine the opportunity set. Finally, form and configuration - the basic layout of cities - are crucial to both sustainability and competitiveness; they are important to articulate; and they are hard to accomplish. The cities in this module seek to elaborate on the definition and application of these frameworks.

In this session we will try to dissect these claims and aspirations to examine questions like: What describes an eco-city? How does an eco-city get financed and accomplished? How do eco-cities compete? How do they scale up and replicate? We are interested in two objectives in particular: 1) debunking hype, while also 2) identifying the core principles that are extensible.

Assignment Questions:

1. Consider Masdar City and the Sino-Singapore Tianjin Eco-City. What are the primary elements of urban spatial arrangement, architecture, transit, water, and electricity infrastructure in each situation? Why did the promoters make those decisions?
2. Which project has the superior business model? Why?
3. What can be learned and extended from these two projects into the finance, planning, and design of other cities?
4. Consider the Green Bonds document from the World Bank. Who would issue a green bond (the borrower) and why? Who would invest in a green bond (the lender) and why?
5. What factors will determine how effective green bonds are with respect to the themes of the course: sustainable urbanization, resilient systems, and the use of private finance and investment to fund, deliver, and operate public infrastructure? Is your answer different with respect to developed economies and emerging markets?

Module 5: Megaprojects and Cities

April 11, 2017 8:30 AM - BSCI | Class 24: Ethiopia's Industrial Parks Strategy

Revised March 22, 2017

Note that there is a short **WRITTEN ASSIGNMENT** due before the start of class today. Details below.

Case: [Ethiopia's Industrial Parks Strategy](#)

Introduction: Ethiopia follows a “Development State” model where the state has extensive involvement in commerce, industry, and the path of economic development. Like many nations, Ethiopia is attempting to move up the value added chain from subsistence agriculture to low skill industries and then to higher value added industries. The Industrial Parks Development Corporation (IPDC), owned wholly by the federal government, is opening a new Industrial Park in the town of Adama. Should the Adama Park continue with the proven positioning of garment and apparel processing, or can the government spur enough economic activity to justify positioning Adama as a metals processing, light manufacturing, and construction materials concentration? This decision calls upon tools of public private partnerships, infrastructure finance and delivery, architecture, trends in population and technology, and of course the impact on economic development.

Discussion Questions:

1. From a policy point of view, do you agree or disagree with the allocation of government resources to be the master developer of the approximately ten IPDC parks as described? Explain your reasoning.
2. From an infrastructure point of view, what are the most important investments in infrastructure to support the parks? Why?
3. As a foreign manufacturing and processing corporation, would you commit to processing and employment in one of the parks? What would attract you? What would deter you?
4. As a foreign infrastructure investor, what needs to happen in your view to make Ethiopia an attractive investment opportunity?
5. What should Dr. Oqubay recommend?

WRITTEN ASSIGNMENT (3 points).

This assignment may be done alone or in teams of 2 or 3. Please upload ONE submission to Canvas and be sure to put all team members' names on the document. Due 8:30 am the morning of class. PDF is preferred.

Word Range: from 750 - 1500 words. Page limit including any exhibits: 3 pages total.

Please draw on some of the main concepts of the course (and other relevant courses) to explain your reasoning.

1. What are the primary strengths and weaknesses of Ethiopia's Industrial Parks Strategy?
2. What should Dr. Oqubay recommend for the park at Adama?

April 18, 2017 8:30 AM - [BSCI | Class 25: Kumbh Mela: India's Pop-Up Megacity](#)

Case: [Kumbh Mela: India's Pop-Up Megacity](#)

Note: [Building Cities: A Technical Note](#)

(You should read the Building Cities Technical Note today so that you can apply it to tomorrow's assignment as well).

Prior cases in this course have considered large and static investments including housing, roads, and power. Some of these investments endure for decades and even centuries; those examples provide one planning horizon. The Kumbh Mela grounds, in contrast, transform once every twelve years from sandbar to mega-city to sandbar over the course of just a few months – accommodating tens of millions of people for a short time. In some ways this is an accelerated pure laboratory for urbanization and its issues. Advance planning -- and adaptability -- are both crucial, since events move quickly. The 2013 Kumbh Mela was administered to great acclaim, in contrast to “understood India” where public competence is often in question. Why and how? Is this replicable? Are there lessons from “ephemeral cities” that can be extended to “permanent cities?”

1. What were the main opportunities, risks, and uncertainties involved in this massive multi-day event?
2. How were the responsibilities allocated? Do you agree with the allocation? If not, how else could it have been done?
3. The 2013 Kumbh Mela appears to have been a success. Do you agree it was a success? Are you surprised that it was a success?
4. Upwards of 80 million people are thought to have made the pilgrimage to dip in the Ganga at the Kumbh Mela. Thinking beyond cities and infrastructure, what other opportunities might the organizers and the government of India have at future Melas, notably with respect to public health and project finance?
5. In this course we have discussed infrastructure, planning, public private partnerships, new cities and old cities all over the world, and from very rich to very poor. Are there extensible lessons from the Kumbh Mela experience?

April 19, 2017 6:00 AM - [BSCI | Class 26: New Songdo City](#)

Revised March 22, 2017

Note: There is a TEAM DRAWING ASSIGNMENT due at 6 am the morning of the class. Further information below, including team composition.

Case: [New Songdo City](#)

Reading: Building Cities: A Technical Note

Spreadsheet: [New Songdo City, Spreadsheet Supplement](#)

Site Outline: [SONGDO site outline](#)

New Songdo City is a 1600 acre new city built from scratch on reclaimed land between Incheon and Seoul, South Korea. It's promoted by the private sector including POSCO and Gale Associates, with support from the South Korean government.

Discussion Questions:

1. As an economic planner, how would you select and nourish industry clusters in New Songdo city?
2. As a master planner and designer, in what sequence would you lay out which aspects of infrastructure and of zoning (with zoning considering use, density, and height)?
3. As a vendor of building, water, transit, power, or ICT products and services, is New Songdo City attractive to you?
4. Can the New Songdo City model be replicated in other countries? Why or why not?

WRITTEN ASSIGNMENT (4 points)

ONE team member is to upload the spreadsheet and drawing to Canvas by 6:00 am the morning of class. Please format the drawing either as PDF or JPEG (even if it's a cell phone photo of a sketch).

Working in self-selected teams of three or four people, please:

Assume it is the fall of 2001, the time of the case and the start of master planning. Complete the Excel worksheet to define your team's building program for New Songdo City.

Using the blank Site Outline (derived from Exhibit 6 of the case), sketch your preferred organization of transit, land use patterns, commercial buildings, green space, and other uses. This can be done at a high level with a general idea of districts, uses, and heights; you are not expected to show individual buildings or lesser arteries across 1600 acres.

This is a DRAWING exercise. There will be an opportunity to share plans with the class. There is NOT an additional written component; the spreadsheet and sketch are the deliverables.

Important note: If you Google the project today you will see one plan, driven largely by special and unique phasing concerns. What would have been a better plan, if unconstrained by those concerns?

This is a graded exercise (4 points). Be sure to write the names of all project team members on both documents.

Points will be allocated by considerations including:

- How did you consider transit?

- How did you think about heights, massing, and density?
- How did you treat the mix of use types?
- How did you treat phasing of construction and occupancy?

It is understood that most teams will not include a good artist.

Note that you must work with different partners than on the Jababeka paper.

April 24, 2017 8:30 AM - [BSCI | Class 27: King Abdullah Economic City: Population Drivers and Cash Flow](#)

Case: [King Abdullah Economic City: Population Drivers and Cash Flow](#)

Fahd Al-Rasheed, CEO of King Abdullah Economic City, is hoping to illustrate a private-sector driven approach to developing stand-alone new cities. If it works and is replicable, the technique could make a very large difference in addressing the many issues we have discussed around global urbanization.

(Note that the financial exhibits in this case do not tie into an integrated financial model. They are discrete studies based on company projections and unit prices). For purposes of the written assignment, the projections should be interpreted but re-modeling is not asked for.

Discussion Questions:

1. EEC/KAEC will not receive the 18bn SAR (Saudi Riyals) funding for which they had hoped - and instead must decide how to proceed with just 5bn SAR. What should Fahd Al-Rasheed do now and why? Specifically, where should he allocate limited capital?
2. In the Industrial Valley, should the KAEC team continue with the ground leasing strategy or sell industrial plots outright?
3. Do you think that KAEC will be a financial success for the investors? A policy success for the Kingdom? A vibrant and desirable place for individuals to work, live, and play?
4. What factors on the ground and in-country are most important for promoters and corporations to consider when investing in new cities or the components of new cities?

April 25, 2017 8:30 AM - [BSCI | Class 28: Phu My Hung](#)

(This is the last session in the course. We will leave 20 minutes at the end for course evaluations. Please bring your laptops).

Case: [Phu My Hung](#)

Note: [Gurgaon](#)

King Abdullah Economic City is a proposed new city to be developed in a planned manner by a special purpose private company. It is located north of Jeddah, Saudi Arabia.

Gurgaon (Gur-gawn') is a mature satellite city near Dehli, the capital of India. The city was developed in a piecemeal fashion, principally by professional real estate firms. Today there are a number of issues as articulated in the case, "Gurgaon."

Phu My Hung (Phoo mee hoong) is a growing new city/satellite city near Ho Chi Minh City (Saigon), Vietnam. The development was promoted (along with the government of Vietnam) by CTD, a Taiwanese industrial conglomerate. CTD is not primarily composed of real estate players.

Phu My Hung appears to be an attractive, well planned, well executed project at a very large scale. The land and rental values are said to be high, the air and water seem good, and the businesses are competitive. We will look at the KAEC, Gurgaon and Phu My Hung situations to see if there are lessons learned or decisions that might have been made differently.

Discussion Questions:

1. Consider KAEC, Gurgaon, and Phu Hung. From a process point of view and a product point of view, what are the strengths and weaknesses of each of these new cities?
2. Consider the overall product that has been created in South Saigon and consider the time frame and the amount of capital that was involved. In hindsight, was the long term investment of capital in Phu My Hung the right decision for CTD in terms of financial ROI? How would you measure the return? Was it the right decision for CTD and for Vietnam in terms of nation building?
3. The CTD team has been asked by city governments and civic leaders in other countries to do this again in another location. Can they? Should they? What would be the key success factors?