Building Smart Cities Leveraging Open Innovation

UGBA 193I -Travel Study Program 4 Units

Spring 2015 (Travel Module: (Dec 28, 2014 – Jan 14, 2015)

Classes: MW 4:00pm – 5:30pm. Location: I-Lab

Instructor: Solomon Darwin
Office Hours: MW 3pm-4pm
E-mail Address: darwin@haas.berkeley.edu

Prerequisite: Passion for Sustainability
Research Advisors: Henry Chesbrough
Corporate Advisors: To be confirmed

Course Objective:

1. Study and evaluate the Open Innovation process "The Smart City in the Making" in India.
2. Capture the lessons currently being learned in India by the architects, engineers, business partners, investors, city managers, supply chains, the federal government and researchers.
3. Evaluate Cost-Benefits of the investment – at a very high level.
4. Based on your field analysis, recommend a framework for India for urban planning for better processes for soliciting external innovations to secure cost effective, designs, technologies, infrastructure and talent to benefit the building of future smart cities that are in the planning stages in India.
5. Group Project: Study four Bay Area cities (one city per group) and propose a smart city model to each of the mayors. Develop at least one use case (i.e. Safety, Traffic, Energy Management etc.)

Haas Travel Study Program

Travel Study program offers Haas majors an opportunity to combine academic curriculum with an international engagement through travel with a faculty instructor. The program would be comprised of an academic course at Haas with an international experience leveraging the Haas Alumni Network. Travel will consist of two weeks during winter break (Dec 28, 2014 – Jan 14, 2015) before spring instruction begins. Course end on April 15 with a presentation to bay area city mayors.

Travel Phase: Travel would complement the academic content learned in class and provide primary research data opportunities. The sponsoring organizations and the local Haas Alumni Network would assist in coordinating the in-country meetings with local business partners, city project managers and city and government officials. The cultural excursions throughout the trip are meant to learn about the in-country relationships between the institutions of government, business and education in generating economic development.

Project Phase: The students are expected to come up with a smart city proposal for each of the five Bay Area cities (TBD). They will engage with City Mayor's office to carry out their projects. The scope and type of the smart city projects will be determined by the needs of the city and Mayor's office. The city mayors are expected to judge the final presentations in April 15th.

Purpose and Background for the Course

The Grand Challenge: The demographic-economic-environmental shift

1. Growth in Urban Population: Urban population consisted of only 3% in the 1800s and grew exponentially since: 14% in1900s, 30% in 1950s, and 50% in 2008. It is projected to be at 75% by 2050.
2. Consumption of Resources: These growing urban populations, in combination with constrained financial and natural resources, are shaping the requirements for the evolution towards smarter, safer and greener cities – placing pressure on governments and municipalities to invest in sustainable infrastructure, deploy information and communication systems, and deliver services to their citizens and their workers.
3. Carbon Footprint: Cities represent three quarters of energy consumption and 80% of CO2 emissions worldwide, and represent the largest of any environmental policy challenge. Traffic congestion costs time, money, wasted fuel and the indirect cost passed on to numerous products that depend on transportation.
4. GDP Growth: Urban areas generate new opportunities and contribute to economic development.

What is a Smart City?

1. Uses information technology to solve urban problems. Better Data = Better Decisions.
2. Monitors and manages traffic, water levels, energy usage, security cameras, waste and communication systems in real time with sensors and cost-effective digital tools that are essentially free.
3. Expected to save operating costs in managing the city that results in lower taxes and happier citizens. “Smart cities are not about just e-gov. They use tech to transform core systems to optimize best use of finite resources,” says Rahul Sharma of IBM India.

Why Study the Models in India?

1. Source of Frugal Innovations: Emerging economies are a great source of frugal innovations as they are birthed in a resource constrained environment surrounded by many barriers. Frugal Innovations, first seen or likely to be used first, in the developing world eventually migrate to the industrialized world. The term “Reverse Innovation” refers broadly to the process whereby goods developed as inexpensive models to meet the needs of developing nations, are then repackaged as low-cost innovative goods for Western nations.
2. Commitment at the Top: Indian Prime Minister Modi wants to build 100 "smart cities" outfitted with high-tech communication. Dholera, “The Smart City in the Making” is his project that was started in his home town before he became the elected as the Prime Minister. The government announced it is investing $1.2 billion over the next year, with more funding coming from private investors and abroad. "Cities in the past were built on riverbanks," Modi said in a June speech. "They are now built along highways. But in the future, they will be built based on availability of optical fiber networks, the next-generation infrastructure." Watch Modi’s City http://www.youtube.com/watch?v=jOFpWFLSqgU
3. Learning from a Major Market: We can already anticipate the problems that these cities face and attack them at the source," said Rahul Sharma, an executive at IBM, which sees smart city technology as a major new market. "India has a fantastic opportunity where we can work outside of the shackles of existing technology."

Final Group Project Deliverables:

1. Study and analyze city's annual budget and financial reports (study of past 10 year trend)
2. Study of demographics, infrastructure, quality and quantitative factors impacting economic growth, consumption of resources, and the environment.
3. Evaluation of the Revenue and Cost structure of the city.
4. Sustainability study and evaluation of the city's current triple bottom line (economic, social and environmental)
5. Recommendation of smart city initiatives to improve the triple bottom line based on best practices and anticipated technological advances.
6. Recommendation for investment and payback analysis.
7. Measurable CSR Initiatives.
8. Recommendations of phase-in modules to work within the cities capital budget.
9. Recommendation of explicit Open Innovation processes in creating, designing, building, planning and managing the cities to sustain themselves.

Grading

• Attendance:	50
• Class Participation -70% for blogging:	100
• Group Assignment:	100
• Individual Assignment:	50
• Mid-Term (Group Work):	200
• Ideas for Peer Groups:	50
• Peer Evaluation:	100
• Final Project:	400
TOTAL POINTS	**1,000**

Assignments are on the next page:

Group Assignment – Understanding the business model of your city: **Due Jan 26**

Below are the financial statements of each of your cities from the public domain:

http://sfcontroller.org/index.aspx?page=802
http://www.oaklandnet.com/government/fwawebsite/accounting/cafr.htm
http://www.ci.berkeley.ca.us/uploadedFiles/Finance/Level_3_-_General/FY2014%20Complete%20CAFR.pdf
http://www.sanjoseca.gov/DocumentCenter/View/23940

The objective is for you to understand the current "Business Model" of the city you had selected to come up with a new business model of each of the cities by leveraging some of the smart city initiatives that they have been researching. Understanding the financials: The city balance sheet and Income statements will help you come up with innovative models that will:

1. Reduce costs, pollution, traffic, waste, crime and citizens' time.
2. Optimize utilization of existing assets - shift from "asset ownership" to "asset access" to generate revenue
3. Increase productivity and efficiency of citizens by investing new technologies.
4. Create new and innovative ways to generate revenue.

Spend some time going over the financial during the class time (4pm -5:30pm) to understand the revenue and expenses of the city as well as its Balance Sheet items. Please write a blog about your individual thoughts and ideas under the day 11 prompt on the course website. This will set the stage for your final project deliverables where you will need create a pro-forma Income Statement and Balance Sheet for each city to show return on investment on your smart city initiatives your group will propose.

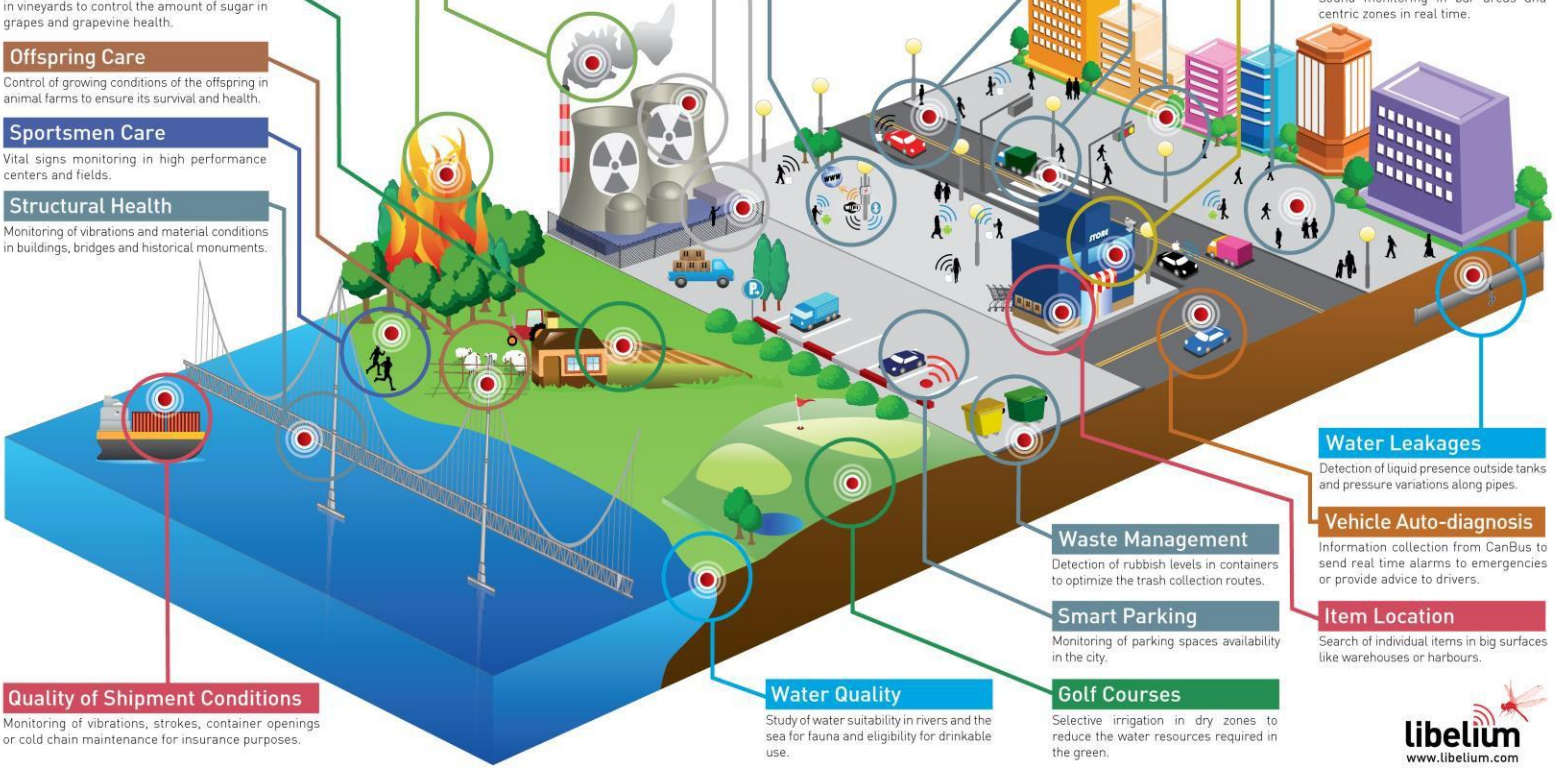
Individual Assignment – Personal Innovation Plan - Due Mar 11th

Create a Business Model Canvass for yourself as an individual. We all have a business model for ourselves – we create value for others and capture that value. Create a business model canvas for yourself – the canvas was presented to you in India. Use the same framework in coming up with a Personal Innovation Plan (a business model) for yourself. I will share mine with you in class to get you started that will serve as a model.

Mid-Term: Group Presentation on Mar 2nd

This is an exercise your group had already started in India. Do some more research and contact people in India if necessary and make a formal presentation. The judges will be the Consulate General of India and several Corporate Executives that are involved in Building Smart Cities in India.

Libelium Smart World



Air Pollution
Control of CO_2 emissions of factories, pollution emitted by cars and toxic gases generated in farms.

Forest Fire Detection
Monitoring of combustion gases and preemptive fire conditions to define alert zones.

Wine Quality Enhancing
Monitoring soil moisture and trunk diameter in vineyards to control the amount of sugar in grapes and grapevine health.

Offspring Care
Control of growing conditions of the offspring in animal farms to ensure its survival and health.

Sportsmen Care
Vital signs monitoring in high performance centers and fields.

Structural Health
Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.

Quality of Shipment Conditions
Monitoring of vibrations, strokes, container openings or cold chain maintenance for insurance purposes.

Smartphones Detection
Detect iPhone and Android devices and in general any device which works with Wifi or Bluetooth interfaces.

Perimeter Access Control
Access control to restricted areas and detection of people in non-authorized areas.

Radiation Levels
Distributed measurement of radiation levels in nuclear power stations surroundings to generate leakage alerts.

Electromagnetic Levels
Measurement of the energy radiated by cell stations and WiFi routers.

Traffic Congestion
Monitoring of vehicles and pedestrian affluence to optimize driving and walking routes.

Water Quality
Study of water suitability in rivers and the sea for fauna and eligibility for drinkable use.

Golf Courses
Selective irrigation in dry zones to reduce the water resources required in the green.

Smart Parking
Monitoring of parking spaces availability in the city.

Waste Management
Detection of rubbish levels in containers to optimize the trash collection routes.

Smart Roads
Warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.

Smart Lighting
Intelligent and weather adaptive lighting in street lights.

Intelligent Shopping
Getting advices in the point of sale according to customer habits, preferences, presence of allergic components for them or expiring dates.

Noise Urban Maps
Sound monitoring in bar areas and centric zones in real time.

Water Leakages
Detection of liquid presence outside tanks and pressure variations along pipes.

Vehicle Auto-diagnosis
Information collection from CanBus to send real time alarms to emergencies or provide advice to drivers.

Item Location
Search of individual items in big surfaces like warehouses or harbours.

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Tentative Schedule

UGBA193i - MW 4:00PM - 5:30PM - Location: I-Lab

Week	Mon/Wed	In-Class Activity	Project Phase
Haas	*12/11/2014*	Orientation - Bonding - Overview of the Course - Kick-off Dinner	*None*
India	*12/29/2015*	Business Model Approach for Building & Operating Smart Cities	*Observation*
India	*1/5/2015*	Developing Framework for Designing Smart Cities - Param Singh	*Observation*
1	*1/21/2015*	Group Exercise: What is your City's Current Business Model?	***Grp Assignment***
2	*1/26/2015*	Why is Open Innovation Relevant in today landscape?	***Grp Assign. Due***
3	*1/28/2015*	How organizations leverage the process of Open Innovation?	*Research*
4	*2/2/2015*	How exponential Innovations are impacting societies?	*Research*
5	*2/4/2015*	Why are ecosystems and communities important for cities?	*Research*
6	*2/9/2015*	What can we learn from innovations from Emerging Economies?	*Research*
7	*2/11/2015*	Lecture 8: How do you measure Innovation?	*Research*
8	*2/16/2015*	Academic Holiday	*Resting & Relaxation*
9	*2/18/2015*	Lecture 9: How do organizations Manage Innovation?	*Analysis*
10	*2/23/2015*	In-class group work specific to the project - details will follow	*Analysis*
11	*2/25/2015*	In-class group work specific to the project - details will follow	*Formulating*
12	*3/2/2015*	Mid-Term: (Group work: Frame work for Smart Cities in India)	*Formulating*
13	*3/4/2015*	Work in groups - Guest Speaker TBD	*Formulation*
14	*3/9/2015*	Work in groups - Guest Speaker TBD	*Formulation*
15	*3/11/2015*	No-Class - Individual assingment due - Personal Innovation Plan	***Individ. Assign. Due***
16	*3/16/2015*	Mid-point Review of the Final Project with city officers	*Formulation*
17	*3/18/2015*	Pre-Presentation to Other City Officials and Corporate Executives for i	*Formulation*
18	*3/23/2015*	Spring Break	*Resting & Relaxation*
19	*3/25/2015*	Spring Break	*Resting & Relaxation*
20	*3/30/2015*	Work in groups - incorporating external ideas	*Testing & Refining*
21	*4/1/2015*	Work in groups - incorporating external ideas	*Testing & Refining*
22	*4/6/2015*	Work in groups - incorporating external ideas	*Testing & Refining*
23	*4/8/2015*	Individual group meetings with Prof. Darwin for final prep.	*Testing & Refining*
24	*4/13/2015*	Individual group meetings with Prof. Darwin for final prep.	*Testing & Refining*
25	*4/15/2015*	Final Presentations to Mayors' Offices & City Managers	***Course Project Due***