MGMT320: Innovations for Asia's Smart Cities

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Time / Venue:	Mondays, Wednesdays & Fridays: 12-3.15pm / LKCSB Seminar Room 2-7

COURSE DESCRIPTION

The world is rapidly urbanizing. More and more cities around the world are becoming increasingly popular as economic powerhouses and magnets for migrants from the countryside, suburban areas and other parts of the world. All big cities in both First and Third World countries as well as emerging markets such as New York, London, Tokyo, Paris, Shanghai, Hong Kong, Singapore, New Dehli, Jakarta etc. have to cope with high population density and serious challenges such as air pollution or traffic congestion. How do we pack more people into big cities and yet continue to achieve a high quality of life? How do we create and manage 'good cities' which are safe, spacious, green, connected, fair and resilient? How can cities create economic wealth while still fulfilling the CSR responsibilities of sustaining a "Green Planet"? What are the best practice designs and technical smart city solutions which could be leveraged to tackle these challenges and how can they be successfully commercialised? This summer school course will provide answers to these questions with special emphasis on the managerial and commercial aspects of smart city concepts.

The key lies in creating and effectively managing innovative and sustainable, smart cities able to leverage on new technologies such as smart grids or sensor networks to create a place where people can live, play and work well. Starting from the stakeholder requirements of citizens and planners of innovative cities, the course will introduce students to urban design concepts as well as commercialization, management challenges and implementation issues of the smart city model. There will also be a focus on how good governance and enabling technologies such as sensor networks can facilitate the creation, management and sustainability of 'good' cities.

With the help of case studies and resource persons such as industry leaders, innovative city designers, tech experts and business development experts from local and int. companies such as ST Electronics, JTC, Jurong Consultants, Frost & Sullivan, IDA International, Urban Redevelopment Authority (URA) etc., students will be familiarized with the opportunities and challenges of the 'smart city business' which represents a key element in the value creation and extraction strategy of the Singapore Government and related businesses. Local site visits to 'smart' urban elements of city state Singapore will complement the learning experience.

LEARNING OBJECTIVES

The overall objective of this module is to equip students with core knowledge of appreciating what it takes to plan, design, build and sustain (mega) cities that are innovative and sustainable and to know the challenges of successfully 'selling' new smart city concepts amidst increasing competition in this field.

By the end of this course, students will be able to appreciate the following 4 areas:

Taxonomy of Innovative & Sustainable Cities
- Describe the core characteristics of a Smart City and respective concepts
- Explain the unique characteristics of each component and how it adds value to innovative and sustainable (smart) cities

Design of Innovative & Sustainable Cities
- Understand the planning and design principles of Innovative & Sustainable Cities
- Explain the workings of each component of Innovative & Sustainable Cities

In-depth study of selected (Mega) Cities
- Be familiar with the challenges of selected mega cities around the globe and understand how the smart city concept can add value in terms of livability

Commercialisation of the Smart City Concept
- Appreciate the challenges in successfully commercializing smart city concepts and applications based on local and international (good practice) examples
- Know some of the key players in the Singapore context which are involved in this service sector and establish network contacts

PRE-REQUISITE/ CO-REQUISITE/ MUTUALLY EXCLUSIVE COURSE(S)
Please refer to the Course Catalogue on OASIS for the most updated list of pre-requisites / co-requisites for this particular course. Do note that if this course has a co-requisite, it means that the course has to be taken together with another course. Dropping one course during BOSS bidding would result in both courses being dropped at the same time.

ASSESSMENT METHODS

Cumulative assessment (CA) constitutes 100% of the final grade, consisting of:

1. **Individual Assessment: 55% of total, consisting of**
   - Class Participation   15%
   - Term Paper   20%
   - MCQ Test   20%

2. **Group Assessment: 45% of total, consisting of**
   - Minor Group Project #1 Presentation   15%
   - Major Group Project #2 Presentation   30%

THERE IS NO FINAL EXAMINATION IN THIS COURSE!

Individual Assessments

<u>Class Participation</u> – students are encouraged to ask questions and offer your opinions in class. Active and well-thought-through discussions are expected from all students. The Rubrics for class participation is in Annex B.

<u>Term Paper</u> – please refer to Annex A for details.

<u>MCQ Test</u> – this will be a series of 20 multiple choice questions testing you on your understanding of all the smart city concepts covered in class, during site visits, and the assigned readings. This will be held on Session 10.

Group Projects

Students will work on two group projects. Each project group will comprise between 4 to 5 students; you can form your own groups.

(Minor) Group Project #1

Each group will be assigned one (mega/smart) city to study based on the following list:

New York City	London	Paris	San Francisco	Sydney
Songdo	Boston	Hong Kong	Madrid	Shanghai
Beijing	Mumbai	Rio De Janeiro	Santander	Copenhagen
Barcelona	Kazan	Moscow	Innopolis	Bogota

This Group project involves the critical analysis of journal / news articles about the respective city with special reference to any of the smart city concepts like in the table below. **No report is**

required. <u>Each team is required to do a 15-minute presentation in class during session 7)</u>. (Softcopy of Powerpoint slides to be submitted)

Urban Planning (zoning)	Moving people (transportation)	Knowledge hub
Water Management	Healthcare & medical hub	Parks & other outdoor spaces
Energy Management	Crime control (high-tech)	City maintenance services
Waste Management	Entertainment (vibrancy)	Any other smart city ideas

(Major) Group Project #2

This Group project involves the deep(er) study into good smart city management practices (which could be) used by a city to meet current and future challenges faced by citizens, administrators and stakeholders plus developing a plausible outline of a business plan (commercial strategy) which could be deployed by the management of relevant technology firms (e.g. with special expertise in medical technology or sensors) in order to find a buyer/customer.

Your focus could be on successfully leveraging a newly developed technology which can help to make a city 'smarter' such as new state-of-the-art lighting systems or solar power or … on the basis of 'good financial engineering' (think of new funding mechanisms such as crowdfinancing) and/or proposing new contractual models of Public Private Partnerships (PPP), able to attract private capital in support of such smart city initiatives. Your project team is to play the role of the company trying to leverage smart city (tech) developments and associated government policies in developing a novel business model which addresses some of the many barriers and risks of utilizing smart city technological solutions such as high risk perceptions or high public deficits (if your customer is a city government). What this implies will be discussed in our team sessions.

Each team is required to do a 15-minute presentation in class in Week 4 (session 12) and to submit a poster summarizing the key components of the proposed business plan (further details to be announced in class; softcopy of powerpoint slides to be submitted at the beginning of the presentation in class).

Academic Integrity

All work presented in this class must be students' own work, and not copied without appropriate citation from any source, including the Internet. Presenting of copied work will result in disciplinary action, which may include award of zero marks for the assignment or a fail grade for the class. This policy applies to all work submitted, either through oral presentation, or written work, including outlines, briefings, group projects, self-evaluations, etc. Students are encouraged to consult the instructor if they have questions concerning the meaning of plagiarism or whether a particular use of sources constitutes plagiarism.

INSTRUCTIONAL METHODS AND EXPECTATIONS

The course approach is based on both analytical rigor and the practical utilisation of Smart City principles and concepts. During the course, a variety of teaching and learning techniques will be employed to enable students to think critically and imaginatively about the various implications of the topic. A high level of student participation is required both in the classroom and in the assignments. Students are required to read widely and to participate actively in projects, presentations, team discussions and in-class discussions. A key assumption is that knowledge is constructed by learners and not merely absorbed from textbooks and people with more experience.

CONSULTATIONS AND TEACHING ASSISTANTS (TAs)

Consultations hours with the lecturer(s) will be via appointment to be made via email.

CLASS TIMINGS

The course is taught in three 3-hour sessions per week over 4 weeks in total between 4 July and 29 July 2016.

RECOMMENDED TEXTS AND READINGS

Introductory Readings:

Sassen, Saskia (2005) The Global City: Introducing a Concept. *Brown Journal of World Affairs*, 11 (2). pp. 27-43
http://ehis.ebscohost.com.libproxy.smu.edu.sg/eds/detail?sid=6f238676-e043-40eb-b741-e3f6a0308e42%40sessionmgr110&vid=1&hid=116&bdata=JnNpdGU9ZWRzLWxpdmUmc2NvcGU9c2l0ZQ%3d%3d#db=bah&AN=16746411

Komninos, N. (2009). Intelligent Cities: Towards Interactive and Global Innovation Environments. *International Journal of Innovation and Regional Development* **1** (4): 337–355(19).

Paskaleva, K. (2009). Enabling the Smart City: The Progress of E-city Governance in Europe. *International Journal of Innovation and Regional Development* **1** (4): 405–422(18).

Menkhoff, T., Evers, H.-D., Chay, Y.W. and Gerke, S. (2011). Achieving Knowledge Economy Status through Good Knowledge Governance: The Singapore KBE Story Revisited", Thomas Menkhoff et al. (eds), *Beyond the Knowledge Trap – Developing Asia's Knowledge-based Economies*. World Scientific, pp. 299-323.
http://www.emeraldinsight.com.libproxy.smu.edu.sg/journals.htm?issn=1367-3270&volume=14&issue=5&articleid=1885975&show=abstract

Belissent, J. & Giron, F. (2013). *Service Providers Accelerate Smart City Projects*. Report by Forrester Research.
http://www.forrester.com/pimages/rws/reprints/document/82981/oid/1-LTEQ9N

Additional Readings:

Additional readings from various sources will be assigned on a weekly basis.

Useful Links
The following links may be useful to students doing research for this module.
- http://cities.media.mit.edu/
- http://www.ibm.com/smarterplanet/us/en/smarter_cities/overview/
- http://www.eu-smartcities.eu/
- http://www.smart-cities.eu/

WEEKLY LESSON PLANS

Session	Topics	Remarks
1 Mo., July 4 2016	**Introduction** • Course overview & learning objectives • Course Outline Specifics and Deliverables • Taxonomy of Innovative & Sustainable Cities • What is a Smart City? Mega City vs. Smart City • Frameworks and rankings of smart cities **Essentials of Urban Planning** • What is urban planning? • Why is it important? • The role of urban planning in smart city governance	Siew Ning
2 Wed., July 6 2016	**Smart Mobility – Overview & Land Transport** • Teleworking: role of ICT as enabler of smart mobility • Categories of land transportation • Policy issues related to public transport • Design of rail systems • Road planning & design • Road traffic management • Road planning & design	Siew Ning
3 Fri., July 8 2016	**Singapore Then and Now – What Makes a City Smart and Innovative?** • Smart urban leadership, governance and innovation • Role of knowledge clusters and knowledge hubs • Case studies: Offshore Marine Cluster and WaterHub • Commercialising innovative smart city concepts: a business model approach • Examples of financing models for smart city approaches • Expectations with regard to Group Assignment #2	Thomas

4 Mo., July 11 2016	**Excursion: Gardens by the Bay** - **Creating a City in a Garden** https://www.gardensbythebay.com.sg/en/the-gardens/about-the-gardens.html Presentation by Dr Adrian Loo, Director, Research & Horticulture	Thomas
5 Wed., July 13 2016	**Excursion: Urban Redevelopment Authority (URA), 45 Maxwell Road, The URA Centre, Singapore 069118.** **http://www.ura.gov.sg** White Room, The URA Centre, 45 Maxwell Road (take the glass lift near Maxwell food centre and go to Level 3). Contacts: Mr Tan Siong Leng, Deputy Chief Executive Officer, Urban Redevelopment Authority Mr Anthony Chong, Executive Systems Analyst, Information Systems, Urban Redevelopment Authority, Tel: +65 6321 8205; Fax: +65 6223 0551; Email: anthony_chong@ura.gov.sg	Thomas / Siew Ning
6 Fri., July 15 2016	**Excursion: Singapore's Sports Hub - Achieving 'Smart Living' Status through Public-Private Partnerships (PPP)** • Appreciating Singapore's urban vision: creating an "ideal work-live-play-learn environment" conducive for k-creation and innovation http://www.jtc.gov.sg/RealEstateSolutions/one-north/Pages/default.aspx • Role of Sports Hub in supporting smart city development goals • What makes a successful PPP tick and how can such a model be used to successfully commercialise a mega smart city project such as the Sports Hub? • The business model of Singapore's Sport Hub • General challenges faced by stakeholders as adopters of smart city approaches	Thomas
7 Mo., July 18 2016	*** Due Date for Group Project #1** **(All groups to present in class; 15 min per presentation)**	Siew Ning Thomas
8 Wed., July 20 2016	*** Due date for Individual Assignment (Term Paper)** **Smart Living: Intelligent Buildings** • What makes a building "smart"? • Residential buildings • Commercial office buildings • Industrial buildings • Underground buildings • How can buildings become more intelligent? **Smart R&D Management** • Science & technology parks • R&D ecosystems & case studies of smart ecosystems	Siew Ning

	(e.g. Silicon Valley)	
9 Fri., July 22 2016	**Smart Living: Healthcare** • VIDEO: Microsoft futuristic video on healthcare • E-Health implementation • Who are the players in a healthcare eco-system? • What are the roles of each player? • Building a Smart Hospital • Case study: Remote patient monitoring system **Smart Living (safety): Components of a Smart Prison** • In-processing & Out-processing • Managing the safety of inmates • Ensuring security of the Prison • Preparing inmates for life after internment	Siew Ning
10 Mo., July 25 2016	*** MCQ QUIZ** Commercialising Smart City Concepts in Asia (Cont'd): Opportunities and Challenges Ahead Guest Speaker: *TBC*	Siew Ning Thomas
11 Wed., July 27 2016	**Group Presentations** *** Due date for Poster Submissions**	Thomas
12 Fri., July 29 2016	**Group Presentations** *** Due date for Poster Submissions**	Thomas / Siew Ning

ANNEX A: TERM PAPER

The table below presents the list of topics for the Individual Assignment (Term Paper). By the drawing of lots, each student will be assigned one of the following topics. You have to do thorough research on the topic and produce a paper of no less than 3500 words.

	TOPIC	POTENTIAL QUESTIONS
1	311 Project (NYC)	Why was the project started? What are its benefits?
2	Medical tourism	Definition. The different types. What is needed to implement this?
3	National ID card	In-depth study of countries that has or is implementing this
4	Living underground	Considerations of having underground homes. Examples.
5	Aging population	Business concepts related to retirement villages. Examples.
6	Bullet trains	Enabling technologies in bullet train design
7	Air pollution	What is smog? Innovative ways of solving the smog problem
8	Greenery	Policies & planning for a green city (as in parks, trees, plants)
9	Physically challenged	How smart cities plan facilities & amenities for the physically challenged
10	Wind energy	How does it work? Is it a viable energy source? Latest news.
11	Nuclear power	Pros and cons of using nuclear power. Latest news.
12	Solar energy	Pros and cons of using solar power. Latest news.
13	Desalination	What is it? How does it work? Pros & cons.
14	Smart prison	Features and functionalities of a smart prison
15	Smart immigration	Detecting illegal activities (e.g. forged passport, smuggling)
16	Vertical farming	5W, 1H of vertical farming
17	ICT for tourism	What are the needs of tourists? How can the needs be met?
18	Smart Airports	How do smart airports minimize waiting / turnaround time for aircraft?
19	Toilets	How to ensure mega cities have modern toilet facilities for residents?
20	Managing the poor	How do mega cities manage the poor and the slums?
21	"Silicon Valley" of Israel	Study of Tel Aviv – a science, innovation & venture hub
22	Science & Tech Parks	Design of science & technology parks (Science Park, Biopolis)
23	Buses	Innovative approaches to management of public bus services
24	Suburban spread	How to manage growth of new cities?
25	Future library	What will future libraries are like in 2025? (physical vs. virtual)
26	Road grids	Study of how existing cities built and managed road grids
27	Anti terrorism	How do smart cities combat terrorism?
28	MOOC	What is it? How is it relevant to education in 2020?
29	Expressway design	How does a government plan for and design expressways?
30	Oil rigs	What's 'the next big R&D thing' in rig construction and why?
31	Innovation hubs	How can Singapore's clusters remain competitive?

ANNEX B: RUBRICS

RUBRIC FOR CLASS PARTICIPATION

C grade	B grade	A grade
Seldom participates and is generally not engaged in discussions Prepared less than half of the time Comments are seldom relevant; does not show understanding of topic being discussed	Sometimes participates but at other times is "tuned out" Fully prepared for more than half of the sessions Comments are sometimes relevant; partial understanding of topic being discussed	Actively participates at appropriate times Fully prepared at almost every session Comments are relevant and reflect good understanding and insight of the teaching materials and topic being discussed

Note: Nodding your head and/or saying "I agree" are not considered as class participation.

RUBRIC FOR INDIVIDUAL TERM PAPER

C grade	B grade	A grade
Partial research work done Subject matter is not fully understood. Scope is incomplete*. Analysis is average Gaps in comments & recommendations	Sufficient research work done – using mainly Internet sources Reasonably clear understanding of the subject matter and scope Good analysis Comments & recommendations are above average	Extensive research work done – beyond Internet sources Very clear understanding of the subject matter and scope. Excellent, thorough analysis Insightful comments & recommendations

* NOTE: On scope completeness, take this example. If you are doing a topic on "A nation's supply of drinking water" and you left out desalination, that would make your scope incomplete.

RUBRIC FOR MINOR GROUP PROJECT #1

C grade	B grade	A grade
Research work is not thorough; covers only the basic (101-level) information about the topic. Presentation shows a lack of understanding of Smart City concepts.	Research work is good and covers all the key points and some minor points about the topic. Presentation shows a basic understanding of Smart City concepts.	Excellent research work that covers all major and minor issues about the topic. Presentation is insightful and demonstrates a deep understanding of Smart City concepts.

RUBRIC FOR MAJOR GROUP PROJECT #2

C grade	B grade	A grade
Business idea presented (orally and on the poster) is uninteresting – either: • Textbook idea, OR • Copy from an existing idea Implementation details are not well thought out, and the business plan canvas is incomplete. Upon further probing, students are unable to articulate potential commercialization challenges. In its current form the output would not be very useful in further developing a complete business plan.	Business idea (presented orally and on the poster) is somewhat interesting – attempts to think out of the box Implementation details are quite well thought out although some minor gaps exist in the business plan canvas. Upon further probing, students manage to explain some (but not all) of the most critical commercialization challenges associated with the proposal. In its current form the output could inspire the further development of a complete business plan despite some minor gaps.	Business idea (presented orally and on the poster) is very interesting and innovative. Shows exceptional insight into the domain area. Very good implementation details based on a plausible, convincing business plan. Upon further probing, students manage to iron out potential stakeholder concerns regarding the commercialization potential and actual (e.g. $) benefits of the proposed smart city solution. In its current form the output would certainly inspire the further development of a complete business plan.