Dear all,

I am asked a lot these days to give my view on smart cities. Over the last two weeks alone we have run two smart city symposia in FoA, one organised by Llewellyn Tang (REC) from a BIM perspective and the other, organised by Rebecca Chiu, from a smart planning perspective. HK’s Science Café is trying to book me for a popular talk on the subject over wine and nibbles, the previous Science Café speaker having talked about black holes. Should smart cities really be on the same menu as black holes? Perhaps. FoA will shortly be releasing a 12-part mini-film series, The Future of Cities, in which (spoiler alert) ‘smart city’ ends up narrating urban civilisation’s future. Another spoiler-trailer: my favourite moment is when the narrator is reflecting on the irresistible pull of human co-habitation and ends his sentence with the words ‘Iron-age’ just as the camera resolves a soft-focus shot of FoA’s Donn Holohan’s sublime iron-age looking woven-bamboo Sun Room in a remote Fujian valley.

I thought I would share one of my professional perspectives on smart cities (I have several) as a way of opening up cross-disciplinary faculty conversation. If any FoA colleague wants to respond with their own think-piece on smart cities, from whatever point of view, please discuss or submit some text to me. The following is adapted from a Preface I wrote a few weeks ago for Winnie Tang’s new book on digital data (Tang W, ‘Are you Future Ready?’, HKEJ & Esri: Hong Kong)

‘Are you Future Ready?’ The question could be asked of any technology domain, but author Winnie Tang, CEO of ESRI China/HK and digital city activist, teacher and thought leader, asks specifically in the context of spatial data technologies and their application to cities. The ‘science and technology of where’, as she neatly puts it, requires no less sophistication than other technologies but is peculiarly relatable. Everyone loves and can understand maps. But the digital technology underlying smart city tech is not quite the same as the digital technology that revolutionised cartography and GIS in the 1980s. The internet of things combined with advances in sensing technology, high resolution urban big data, AI and ultra-high-speed processing, means that the technological future that is arriving is truly novel. In particular, it is novel in its ability to detect and predict patterns and model alternative trajectories and outcomes. CL Dodgson, the Oxford mathematician and author of ‘Alice in Wonderland’ (pen-name Lewis Carroll), famously once suggested through the voice of one of his fantasy charcters, that the very best scale for a map of the world would be 1:1. A new metaphor has lately slipped into discussions of computational representation: the digital twin. A digital twin of a city suggests that our computational models have captured so much
information and meaning from the real city that we can use them as a proxy complex system for monitoring, understanding and exploring the impacts of real urban interventions – design interventions or fiscal, regulatory or other policy. This takes us rather a long way from a map as 2D representation of a city or GIS as a multi-dimensional representation. One of my former post-docs was recently working with a famous American university on the highest resolution model of transport and land-use interaction ever attempted for a small but advanced Asian city state. It is not so dissimilar to Dodgson’s 1:1 map of the world: individual households modelled as autonomous interacting agents imbued with decision-making logic that maximises utility subject to costs and so on. The result is at one time awe-inspiringly complex, beautiful, fascinating and overwhelming. It is also difficult to interpret analytically. As with the pixilation problem in remote sensing and photogrammetry technology, the finer the detail, the harder it can sometimes be to interpret. When the model is a large number of interacting multi-dimensional decision agents, sensors or social-media data points, what-if simulations are governed by many parameters, which make results unstable, highly dependent on starting conditions and on multiple unseen interactions between parameters. The attractiveness of the 1:1 model’s complexity becomes a liability when it comes to modelling cause-effect and interpreting results. Historically, scientists and philosophers have abstracted for a good reason. It is difficult to understand the way the human mind thinks, for example, without a robust abstraction of the idea of morality or learning or human judgement. The multiplicity of ‘raw’ information in a digital twin model of a city leads us, ironically, backwards (or is it forwards?) towards box thinking, where we observe systemic behaviour without being sure of the contributions of individual variables and parameters. Another sense in which more complexity leads to more black-box thinking is in the application of AI and advanced data-science. We try to more clearly explicate urban analytics by using more and finer scale data and in so doing need to make more use of pattern-based tools from AI, generative computing and data-mining, which take us further away from explicitly behavioural models. Behavioural analysis is pushed both backwards and forwards in the process of inquiry – in structuring data and inquiry and in interpretation of patterns. What all this means is that the techniques and paradigms for understanding the spatial dynamics driving city growth and change are going through a subtle shift from 20th century style urban social science towards a 21st style of urban science. The roles, weighting and sequencing of the various stages of scientific thought – abduction, deduction and induction – are shifting. Are you ready for the future? The question is a profound one for those working with, teaching and reflecting upon the spatial sciences and arts, and their application to urban society and the built environment. Should we dispense with formal theory-driven urban analytics and go straight to pattern recognition? A complicated structural equation model, or hybrid utility-maximisation-discrete-choice-agent-based-model or a general equilibrium model may dig down towards a 1:1 model of the dimensions of human spatial calculus, for example modelling home-buying, capital investment or commuter route choices. But do they produce more insights than observing millions of cases of actual locational or route-choice behaviour? Should the later be used to calibrate the former? Or the former used to explain the latter? The future of the urban digital twin is not quite with us but it almost is. It is not just new skills that are required; real-time urban data streams and massive systems of linked records registered to multiple geographies right down to the individual, all force us to re-invent the ways in which we empirically and theoretically investigate, understand, model, design and influence the city.

Congratulations for the successes reported below and thanks for the huge amount of dedication, time, brain-power and inventiveness represented.

Chris
Teaching and other Achievements

Department of Architecture

1. Dr. Cole Roskam

- was nominated by peers to serve as book reviews editor for Europe, Africa, and Asia from 1750 for the *Journal of the Society of Architectural Historians (JSAH)*. I will begin my three-year term in May.

- has been selected as one of sixteen finalists to participate in a collaborative and interdisciplinary research initiative launched by the Canadian Centre for Architecture (CCA) and funded by the Andrew W. Mellon Foundation titled *Centring Africa: Postcolonial Perspectives on Architecture*. The eighteen-month project will "analyze and historicize the ways in which architecture manifests transformations in post-independence African countries. The grants will support original, case-based research on concrete projects, actors, architectural typologies, key geographies, or urban developments that explore the history of architecture’s agency in sub-Saharan Africa."

Department of Real Estates and Construction

1. Dr. Isabelle Chan

- has successfully awarded the following research grant:

  - PI for the project entitled: 'Underground Facilities Management and Occupant Health: Case Studies in Hong Kong' funded by Seed Fund for Basic Research, The University of Hong Kong, HK$ 300,000, 2019-21.

  The cost of underground developments is significantly higher than that of aboveground (ranging from 1.3 to 6 times). The economic burden can be even higher if the environment is built with inadequate consideration of user’s health (building-related health problems cost the NHS £1.4bn annually). Proper facilities management can enhance building users’ health. This study thus aims to enhance underground users’ health through developing an integrated Facilities Management-Health model.

2. Ms. Zhou Lu (a PhD candidate jointly supervised by Prof. K.W. Chau and Dean Webster)

- joined Indianan University Bloomington, USA, as an Ostrom Visiting Scholar from 18 August 2018 to 17 February 2019. During her stay, she presented a paper titled “Property rights, transaction costs, and social gains: An analysis of China’s first land development rights market” which is co-authored with the supervisors mentioned above at the Ostrom Workshop (13 Feb) and 13th Planning, Law, and Property Rights (PLPR) conference (18-22 Feb) at Indianan University and Texas A&M University (Texas A&M) respectively. She also organised a PhD workshop of PLPR on 18 Feb at Texas A&M, and invited Dean Webster to be the mentor of the workshop.
Department of Urban Planning and Design

1. 2019 Esri Young Scholars Award (Hong Kong) - 1st, 2nd Prizes, and Merit Award

- Three of DUPAD students participated in this year's 2019 Esri Young Scholars Award (Hong Kong) competition with excellent results. The award was adjudicated by a panel of 16 experts. They obtained the 1st Prize, 2nd Prize, and Merit respectively (https://esrichina.hk/ysa/Result_Announcement.aspx):

  1st Prize: Mr. Chan Chun Yin, Tommy, Yr. 4, BA(US) “Accessible to all? — Finding out inequality in public transit accessibility for Hong Kong residents”.

  1st runner up (2nd Prize): Mr. Chan Tin Chou, Isaac, Yr. 4, BA(US) “The Geography of the Producer Services in Hong Kong — Planning, Development and Policy Implications”.

  Merit: Miss Sammi Ng, Yr. 2, BA(US) "Up and Down the Age of Slope".

The 1st Prize winner will win a trip to attend and present the work in the Esri User Conference in 8-12 July in San Diego, USA that will be attended by 180,000 GIS professionals, and the top 3 winners will be awarded a summer internship place at the Urban Renewal Authority. Tommy will be awarded the Young Scholars Award during the Special Achievement in GIS Awards Ceremony along with other Young Scholars from around the world.

The Esri Young Scholars Award (YSA) program was launched in 2012 to recognize the exemplary work in geospatial sciences of undergraduate and graduate students in universities around the world. The goal of the 2019 Esri Young Scholars Award (Hong Kong) competition is to encourage and recognize university students who can create more innovative GIS applications that lead to a better society and meet the diversified needs of Hong Kong metropolis city.

A special thanks Dr. Kenneth Tang for briefing students on this competition in achieving such results.
2. Mr. Jason Hilgefort

Master of Urban Design, International Fieldtrip 2019

- MUD students and teachers embarked on a Field Study Visit [FSV] to the Netherlands during reading week from March 2 to 9, 2019, as part of the Urban Design International Studio. Given the rise of significance of the Greater Bay Area vision by the Chinese government, the studio seeks to learn from other poly-centric city governance models – with related systematic characteristics. The Randstad [the cities of Holland – Amsterdam, the Hague, Utrecht, Rotterdam, etc] has acted as a vision for the region’s development for over half a century. Amsterdam, similar to Hong Kong, is the focus of intense urban development of the region. Recently, the North Holland region identified the pressing need for a significant increase in housing, while also facing growing demands for affordable housing and the influx of Asian real estate investment pressure. The studio seeks not merely to ‘learn from the Netherlands’ but also to share lessons from the Greater Bay area in regards to rapid urban development and their relationship to urban systems [water, economic, migration, etc].

Visiting Amsterdam western harbour site area

The MUD students visited their four sites for the studio’s investigation – Havenstad [aging harbour area], Sluisbuurt [peninsula designated for new high density vertical development], Zuidoost [southeast Amsterdam experiencing diverse redevelopment models], and Almere Pampus [new waterfront development of modernist new town].

Meeting with OMA in Rotterdam Office in Amsterdam Station

Public space engagement
Beyond site visits the trip visited assorted government offices, practices, and research institutions in Amsterdam, Rotterdam, Delft, and Almere. OMA shared with the group its relevant work the region, Bajes Kwartier redevelopment of a former prison to sustainable mixed use community and Feyenoord City – a plan for a large development around a new stadium design. MVRDV shared its ongoing master plans in Almere, including Oosterwold [a DIY development strategy] and Floriade 2022 [plan to use horticultural expo to form a new community model]. Eric van der Kooij shared the visions and challenges of the City of Amsterdam’s growth realities for the coming decades. While at TU Delft Taneha Kuzniecow Bacchin of Delta Urbanism, Adrien Ravon of The Why Factory, and Roberto Rocco of the Urban Planning Department shared their differing research techniques.
Jason Hilgefort led the fieldtrip and was joined by three other studio teachers Jianxiang Huang, Brian Jan, and Yujun Yin together with 33 Master of Urban Design students. They visited the new transit infrastructure at Rotterdam Central Station, the Markethall mixed use development, and the orchestrated bottom up planning models of Amsterdam North. In the week following the students were able to engage in unsupervised fieldtrips in other parts of Europe – including Italy, Greece, Germany, Spain and Switzerland for comparative purposes.

3. Collaboration with University of California Berkeley and HKU Architecture and Landscape

- The Architecture and Landscape of HKU set up a collaboration between themselves and UC Berkeley over the past year. They invited the MUD program to join in the process of collaboration. The focus of the initial research was to share bay area findings from both sides. MUD was able to join in the collaborative conversation and share our research both on the Greater Bay Area and to add our findings in regards to the Delta Metropol. We were happy to not just join with Berkeley professors, but further we excited about the further potentials of better links between the MUD, Arch, and LArch programs of HKU. More sharing of knowledge, more learning for all, better for all.

4. Professor Bo Sin Tang (Program Director of MSc Urban Planning)

- has appointed by the HKSAR Chief Executive as Non-Executive Director of the Hong Kong Urban Renewal Authority: 
  https://www.info.gov.hk/gia/general/201904/12/P2019041200444.htm

- MSc Urban Planning – Year 1 students

As part of Strategic Planning Studio, MUP Year 1 students and teachers had a study tour to Shenzhen during the Reading Week (4 March to 7 March 2019) to examine its overall planning and development of the innovation and technology sector. The group visited and heard presentations by the China Academy of Urban Planning and Design (Shenzhen), Shenzhen-Hong Kong Technology & Innovation Special Cooperation Zone, Authority of Qianhai Shenzhen-Hong Kong Modern Service Industry Cooperation Zone, Shenzhen Nanshan Science & Technology Innovation Bureau, Shenzhen Nanshan Development Research Centre, Shenzhen Urban Planning & Land Resource Research Centre, Shenzhen Bay Eco-Technology Park, Shenzhen Software Base, Tencent Headquarters, Bao'an Urban Planning Exhibition Hall and Shenzhen Longhua Urban Planning Exhibition Hall. The students will carry out follow-up research and interviews with the relevant professionals, and prepare recommendations on strategic planning for collaborative and sustainable development of Hong Kong and Shenzhen in our innovation and technology sector. A public presentation of
their recommendations is scheduled to be held at the City Gallery of Hong Kong on 11 May 2019.

5. Professor Anthony Yeh (Program Director of BAUS)

- DUPAD Students Winning 1st, 2nd Prizes, and Merit Award in 2019 Esri Young Scholars Award (Hong Kong) Competition.

Three of our BAUS students participated in this year’s 2019 Esri Young Scholars Award (Hong Kong) Competition with excellent results. The award was adjudicated by a panel of 16 experts. They obtained the 1st Prize, 2nd Prize, and Merit respectively (https://esrichina.hk/ysa/Result_Announcement.aspx):

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Merit: Miss Sammi Ng (BA(US) Year 2), "Up and Down the Age of Slope".

Congratulations of their achievements.
Esri is the largest GIS firm in the world. The Esri Young Scholars Award (YSA) program was launched in 2012 to recognize the exemplary work in geospatial sciences of undergraduate and graduate students in universities around the world. The goal of the 2019 Esri Young Scholars Award (Hong Kong) competition that was launched in HK in 2017 is to encourage and recognize university students who can create more innovative GIS applications that lead to a better society and meet the diversified needs of Hong Kong metropolis city.

The 1st Prize winner will win a trip to attend and present the work in the Esri User Conference in 8-12 July in San Diego, USA that will be attended by 180,000 GIS professionals, and the top 3 winners will be awarded a summer internship place at the Urban Renewal Authority. The 1st Prize Champion will be awarded the Young Scholars Award during the Special Achievement in GIS Awards Ceremony along with other Young Scholars from around the world.

DUPAD students have been doing very well in the past Esri Young Scholars Award (Hong Kong) since it was first launched in Hong Kong in 2017.

**Division of Architectural Conservation Programmes**

1. Dr. Hoyin Lee
   - has appointed by the HKSAR Chief Executive as Non-Executive Director of the Hong Kong Urban Renewal Authority: https://www.info.gov.hk/gia/general/201904/12/P2019041200444.htm

**Division of Landscape Architecture**

1. Mathew Pryor
   - was invited to present his recent flipped classroom research study at the CUHK Flipped Classroom Seminar on 21 March 2019

Socialized learning: shared-regulated learning within a large-sized flipped classroom (Pryor, M. & Lin, HYN.)

**Abstract**: Vygotsky’s Social Constructivist Learning Theory (1978), argued that learning is an active and social process, and recent research studies suggest that
technology-based collaborative groups have significantly better learning performance than individual learners, although, most of these studies relate to online distance learning or virtual classroom contexts. In this seminar, Mathew Pryor presents an on-going teaching development initiative that looks to promote socialized learning within a large-sized flipped classroom in HKU’s Common Core program, as a way of enhancing student engagement and increasing effective collaboration in both pre-class and in-class learning environments. Based on the five key factors of Hasler-Waters and Napier (2002) ‘effective collaboration model’, (providing support; get acquainted; establish communication; build trust; and get organized) the instructional design aims to facilitate socially shared-regulated learning. Students are required to work intensively on diverse structured exercises, in the same pre-class and in-class groups, that actively scaffold their learning and knowledge co-construction, by encouraging them to share their own views, explore concepts through different cultural perspectives, and reflect on their own understanding. The positive impacts of socialized learning on student engagement in the flipped classroom are salient in both student survey and feedback.”

- was a member of the team led by Prof Gray Kochhar Lindgren that received the HKU Outstanding Teaching Award (Team) for their project ‘Transdisciplinarity in Action: Creating Multiscalar Teaching and Learning Platforms in the Common Core’

“The mission of the Common Core is to provide the highest quality cross-disciplinary learning for our undergraduates, and, as an essential aspect of this task, we also must provide a culture of effective experimentation that enhances the learning of our colleagues, our community and our partners around the world. Working along multiple fronts to create such a culture, the team has begun to more deeply explore transdisciplinarity as a framework for configuring teaching and learning as transformative acts.

Transdisciplinarity articulates possibilities that lead not only to more “content” knowledge—which is of course absolutely necessary for any learning to occur—but also to a greater capacity for posing questions, inventing collaborations, more effectively scaling responses to vexing issues, and generating a creative impact for students, colleagues, and society. Through enhancing the organizational and curricular flexibility of the Common Core, we have been making these ideals more tangible.

Mathew has flipped his classroom for CCHU9001 Designs on the Future; Gina Marchetti has created a MOOC based on CCGL9001 Hong Kong Cinema Through a Global Lens; Julian Tanner has taught our first iteration of CCST8001, the Transdisciplinary Team Project, an advanced cross-faculty seminar focused on the diagnosis of Hepatitis-C and Public Health Communications; and Gray Kochhar-Lindgren has facilitated the Transdisciplinary Research Nomads and the Transdisciplinary Undergraduate Research Exchange.

Our goal, as a team, is to deepen the classroom and institutional impact of these practices; to create nodes of reflective connectivity across multiple boundaries; and to provide programmatic platforms to move the needle toward positive social change. These are, for us, inseparable aspects of innovation in teaching and learning for all of our undergraduates.”
- Mathew received the Council of Educators in Landscape Architecture (USA) ‘Excellence in Teaching Award (Senior Level) 2019’. This is the most widely recognized international award in Landscape Architecture Education Dr Jiang Bin, kindly received the award on his behalf at the ceremony in Sacramento in March 2019.

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**Research Achievements**

**HKUrbanLab research groups**

**Faculty of Architecture**

1. University Research Committee (URC) Internal Research Support Programmes

- An (incomplete) summary of project funds won by our capable young researchers. This summary might be incomplete as our faculty may have applied other seed funds while the results are not searchable now.

Congratulations to all the winners!

<table>
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<tr>
<th>Schemes</th>
<th>Project Title</th>
<th>Amount (HK$)</th>
<th>Status</th>
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<tbody>
<tr>
<td>201810159014 Seed Fund</td>
<td>Harness the Power and Potential of Familiar Strangers in Hong Kong, by Dr J Zhou, Dept of Urban Planning &amp; Design</td>
<td>93,200</td>
<td>On-going</td>
</tr>
<tr>
<td>201811159177 Seed Fund</td>
<td>Towards spatiotemporal building city information model (BIM CIM): Semantic voxel modeling based on Gestalt principles, by Dr F Xue, Dept of Real Estate &amp; Construction</td>
<td>93,200</td>
<td>On-going</td>
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### Schemes

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<tr>
<th>Scheme ID</th>
<th>Project Title</th>
<th>Amount (HK$)</th>
<th>Status</th>
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| 201811159121 | **Seed Fund for Basic Research**
  - Assessing Transport Infrastructure Development in Belt and Road Initiative: Development of a Protocol for Connectivity Impact Analysis, by Dr G Sun, Dept of Urban Planning & Design | 93,200       | On-going     |
| 41st round URC PDF/RAP Scheme | Smart Construction and Robotics, by Dr W Lu, Dept of Real Estate and Construction | Not applicable | On-going     |
| 201810160013 | **Seed Fund for Translational and Applied Research**
  - Developing a Local Positioning System (LPS) for smarter construction, by Dr W Lu, Dept of Real Estate & Construction | 130,000      | On-going     |
| 1. Dr. Cole Roskam | **Architecture, Urbanism and Humanities Initiatives (AUHI)** | 70,000 (HK Side) | On-going     |

#### Architecture, Urbanism and Humanities Initiatives (AUHI)

1. Dr. Cole Roskam

   - His book, *Improvised City: Architecture and Governance in Shanghai, 1843-1937*, has been published by the University of Washington Press:


**Abstract**: Improvised City illuminates the interplay between the city's commercial nature and the architectural forms and practices designed to manage it in Shanghai's three municipalities: The International Settlement, the French Concession, and the Chinese city. This book probes the relationship between architecture and extraterritoriality in ways that challenge standard narratives of Shanghai's built environment, which are dominated by stylistic analyses of major landmarks. Instead, by considering a wider range of town halls, post offices, municipal offices, war memorials, water works, and consulates, Cole Roskam traces the cultural, economic, political, and spatial negotiations that shaped Shanghai's growth. Improvised City repositions Shanghai within architectural and urban transformations that reshaped the world over the late nineteenth and
early twentieth centuries. It responds to growing academic interest in the history of modern and contemporary Chinese architecture and urbanism; the ongoing, shifting relationship between sovereignty and space; and the variegated forms of urban exceptionality—such as special economic zones, tax-free trading spheres, and commercial enclaves—that continue to shape cities.

CUSUP

1. Dr. Roger Chan

- Dr. Chan was interviewed by the Hong Kong Economies Times on the Lok Ma Chau Loop and the Guangzhou-Shenzhen-Hong Kong Innovation Corridor in the Greater Bay Area reported on 15 April 2019, A8. https://ps.hket.com/article/2325916/河套區可打造科學園 2.0%20

港大陳振光: 拓創意科學經濟走廊 https://paper.hket.com/article/2325758?lcc=ae

河套區可打造科學園 2.0 港大陳振光：拓創意科學經濟走廊

- Dr. Chan attended the American Association of Geographers Annual Meeting held in Washington DC and gave a presentation entitled “Strategic Spatial Planning and the Greater Bay Area.”

A special session on “Innovation, regeneration and spatial restructuring in China” was organized with his doctoral graduates, Lingyue Li, Dingxi Huang and Xian Shi at this year’s conference.

He further discussed with Secretary General and executive committee member of the Asian Urban Research Association on the FoA’s Belt and Road Observatory (OBORObs) during the conference.
Dr. Chan and his PhD graduates at the AAG Annual Conference held in Washington DC on 5 April 2019.

Dr. Chan and Professor George Pomeroy and Professor Debnath Mookherjee of the Asian Urban Research Association.

2. Alain Chiaradia and Dr. Lingzhu Zhang

- Have published the following papers:


Urban Morphology / Urban Form

Urban morphology is the study of the physical form of settlements. More precisely, it is the study of the formation of urban fabric components and the relationship of these components, which describe their compositions and configurations through time. These complex phenomena can be analyzed at different spatial scales and across disciplinary boundaries. Urban morphology is of interest to many different knowledge domains. Its theoretical aspects relate to urban geography, history, architecture, and spatial economics. In its
applied forms, it is an important component of urban design, but it is also of concern to development, urban planning, and urbanization.


Abstract: This paper propose a new GIS based spatial design network analysis (sDNA+) that can be used in three-dimensional built environment. Spatial configuration and its relation to pedestrian movement are quantitatively analysed in the case of Hong Kong Central area. The comparison between outdoor only and indoor + outdoor 3D pedestrian networks shows that it is unrealistic to study the multilevel pedestrian network in high density built environments by only considering the outdoor pedestrian network. Indoor + outdoor 3D pedestrian network helps designers and researchers to decode human-centred spatial configuration and pedestrian activity patterns.

3. Professor Shenjing He

- Prof. He organized three paper sessions entitled “Changing constructions of rurality and rural-urban relationships in a post productivist era-I, -II, -III”, together with Prof. Darren Smith of Loughborough University, at the 2019 American Association of Geographers annual meeting, Washington DC, US, 3-7 April, 2019.

- Prof. He also presented a paper entitled “Policy mobilities, politics of scale and latecomer advantages: Globalizing strategies of small inland cities” and chaired the paper session entitled “Policy Mobilities, Where Next?” at the same conference.

- Prof. He was invited to give a research seminar entitled “Making Sense of China’s Residential Differentiation Using Thick Data and Big Data”, as part of the monthly Speaker Series organized by Confucius Institute for China’s Culture and Economy (CICCE) at University at Albany, State University of New York, 8 April, 2019.

- was invited as an international specialist to join the “International Workshop on Data Intensive Urban Studies” hosted in Kyoto, Japan, 1-2 March 2019, and was invited to give a talk entitled “Enclave Urbanism in Chinese Cities” at the Special Seminar on Urban Studies in China, Center for Southeast Asian Studies, Kyoto University, Japan on 4 March, 2019.

- was invited to join the Mansueto Institute workshop on Cities and Urbanization in China, and give a talk entitled “Making sense of Chinese cities: combining thick data and big data” at the University of Chicago Hong Kong Campus, on March 11-14, 2019.
4. Dr. Derrick Ho

- has published the following joint papers:


**Abstract**: Background A cross-sectional study using a convenience sampling method was conducted to understand how green space and accessibility of common public open spaces in compact urban areas affect physical activity and healthy diets of residents. Methods A total of 554 residents completed a structured questionnaire on quality of life, physical activity level and healthy eating practice. Particularly, categories of physical activity and durations were obtained by using the short form Chinese International Physical Activity Questionnaire (IPAQ-C), then the Metabolic Equivalent of Task (MET)-minutes/week was calculated using the formulae (walking minutes × walking days × 3.3) + (moderate-intensity activity minutes × moderate days × 4.0) + (vigorous-intensity activity minutes × vigorous-intensity days × 8.0). The percentage of green space was calculated based on a spatial buffer with a 500 m radius from participants’ geocoded addresses using a SPOT (‘Satellite Pour l’Observation de la Terre’ in French) satellite image-derived vegetation dataset. Parks, promenade and sports facilities were examples of open spaces. Results The sampled population who lived with green space averaged 10.11% ± 7.95% (ranged 1.56 – 32.90%), with the majority (90%) performing physical activities at medium and high levels. MET-minutes/week was significantly associated (Pearson r = 0.092; p < 0.05) with the green space percentage. Relatively active residents commonly used open spaces within the district for performing exercise, in particular, parks and promenades were mostly used by older residents, while sports facilities by the younger groups at age 25–44 and <25 years. Conclusions Current findings suggested promotion of exercise could be achieved by the design or redesign of built environment to include more parks accessible to the residents with the increase of vegetation.

(ii) Shanshan Chen, Deyong Hu, Man Sing Wong, Huazhong Ren, Shisong Cao, Chen Yu, **Hung Chak Ho**. (2019).

**Characterizing spatiotemporal dynamics of anthropogenic heat fluxes: A 20-year case study in Beijing–Tianjin–Hebei region in China. Environmental Pollution, in press.** DOI: https://doi.org/10.1016/j.envpol.2019.03.113

**Abstract**: Rapid urbanization, which is closely related to economic growth, human health, and micro-climate, has resulted in a considerable amount of anthropogenic heat emissions. The lack of estimation data on long-term anthropogenic heat emissions is a great concern in climate and urban flux research. This study estimated the annual average anthropogenic heat fluxes (AHFs) in Beijing–Tianjin–Hebei region in China between 1995 and 2015 on the basis of multisource remote sensing images and ancillary data. Anthropogenic heat emissions from different sources (e.g., industries, buildings, transportation, and human metabolism) were also estimated to analyze the composition of AHFs. The spatiotemporal dynamics of long-term
AHFs with high spatial resolution (500 m) were estimated by using a refined AHF model and then analyzed using trend and standard deviation ellipse analyses. Results showed that values in the region increased significantly from 0.15 W m⁻² in 1995 to 1.46 W m⁻² in 2015. Heat emissions from industries, transportation, buildings, and human metabolism accounted for 64.1%, 17.0%, 15.5%, and 3.4% of the total anthropogenic heat emissions, respectively. Industrial energy consumption was the dominant contributor to the anthropogenic heat emissions in the region. During this period, industrial heat emissions presented an unstable variation but showed a growing trend overall. Heat emissions from buildings increased steadily. Spatial distribution was extended with an increasing tendency of the difference between the maximum and the minimum and was generally dominated by the northeast–southwest directional pattern. The spatiotemporal distribution patterns and trends of AHFs could provide vital support on management decision in city planning and environmental monitoring.


Abstract: Anthropogenic activities in coastal regions are endangering marine ecosystems. Coastal waters classified as case-II waters are especially complex due to the presence of different constituents. Recent advances in remote sensing technology have enabled to capture the spatiotemporal variability of the constituents in coastal waters. The present study evaluates the potential of remote sensing using machine learning techniques, for improving water quality estimation over the coastal waters of Hong Kong. Concentrations of suspended solids (SS), chlorophyll-a (Chl-a), and turbidity were estimated with several machine learning techniques including Artificial Neural Network (ANN), Random Forest (RF), Cubist regression (CB), and Support Vector Regression (SVR). Landsat (5,7,8) reflectance data were compared with in situ reflectance data to evaluate the performance of machine learning models. The highest accuracies of the water quality indicators were achieved by ANN for both, in situ reflectance data (89%-Chl-a, 93%-SS, and 82%-turbidity) and satellite data (91%-Chl-a, 92%-SS, and 85%-turbidity. The water quality parameters retrieved by the ANN model was further compared to those retrieved by “standard Case-2 Regional/Coast Colour” (C2RCC) processing chain model C2RCC-Nets. The root mean square errors (RMSEs) for estimating SS and Chl-a were 3.3 mg/L and 2.7 µg/L, respectively, using ANN, whereas RMSEs were 12.7 mg/L and 12.9 µg/L for suspended particulate matter (SPM) and Chl-a concentrations, respectively, when C2RCC was applied on Landsat-8 data. Relative variable importance was also conducted to investigate the consistency between in situ reflectance data and satellite data, and results show that both datasets are similar. The red band (wavelength ≈ 0.665 µm) and the product of red and green band (wavelength ≈ 0.560 µm) were influential inputs in both reflectance data sets for estimating SS and turbidity, and the ratio between red and blue band (wavelength ≈ 0.490 µm) as well as the ratio between infrared (wavelength ≈ 0.865 µm) and blue band and green band proved to be more useful for the estimation of Chl-a concentration, due to their sensitivity to high turbidity in the coastal waters. The results indicate that the NN based machine learning approaches perform better and, thus, can be used for improved water quality monitoring with satellite data in optically complex coastal waters.
- Dr. Ho has been invited to speak for a seminar presentation:


Title: Remote sensing application and geospatial analysis to evaluate community health risk associated with weather-related air pollution events

**Abstract:** Air pollution has long been identified as a major environmental factor that can influence health risk. While air pollution can be caused by traffic problems and urban development, weather-related events such as wildfire, dust storm, and haze can also increase the intensity of air pollution. In addition, the sudden increase of air pollution can be fatal because local population may have less adaptation to the extreme scenario related to low air quality. Based on these facts, satellite-derived aerosol optical depth (AOD) product retrieved from the Moderate Resolution Imaging Spectroradiometer (MODIS) was applied to estimate spatial variability of air quality during the weather-related air pollution events. Geospatial modelling combining with spatial regression, epidemiological design, demographic data and urban morphologic datasets were also used to estimate the potential health risk caused by the increase in air pollution during the weather-related events. The results can be used to identify regional hotspots that may have high environmental health burden, in order to deliver planning protocols for community planning, disaster management, and emergency response.

5. Dr. Weifeng Li and Huagui Guo (Ph.D. candidate)

- Attended the annual conference of AAG at Washington, DC during 3rd-7th April, 2019. Huagui Guo gave a presentation titled “Long term exposure to PM2.5 and Trachea, Bronchus and lung cancer mortality in rural China” on 3rd April. Dr. Li gave a presentation titled “Planning for Resilient Cities: Human-environment Transaction Model for Understanding Individual Resilience to Urban Flooding” on 7th April.

6. Dr. Weifeng Li

- Dr. Li has published the following joint papers:


**Abstract:** While the aerosol optical depth (AOD) product from the Visible Infrared Imaging Suite (VIIRS) instrument has proven effective for estimating regional ground-level particle concentrations with aerodynamic diameters less than 2.5 μm (PM2.5), its performance at larger spatial scales remains unclear. Despite the wide application of statistical models in building ground-level PM2.5 satellite remote sensing retrieval models, a limited number of studies have considered the spatiotemporal heterogeneities for model structures. Taking China as the study area, we used the VIIRS AOD, together with multi-source
auxiliary variables, to develop a spatially structured adaptive two-stage model to estimate ground-level PM2.5 concentrations at a 6-km spatial resolution. To this end, we first defined and calculated a dual distance from the ground-level PM2.5 monitoring data. We then applied the unweighted pair-group method with arithmetic means on dual distances and obtained 13 spatial clusters. Subsequently, we combined the time fixed effects regression (TFER) model and geographically weighted regression (GWR) model to develop the spatially structured adaptive two-stage model. For each spatial cluster, we examined all possible combinations of auxiliary variables and determined the best model structure according to multiple statistical test results. Finally, we obtained the PM2.5 estimates through regression mapping. At least seven model-fitting data records per day made a good threshold that could best overcome the model overfitting induced by the second-stage GWR model at the minimum price of losing samples. The overall model fitting and ten-fold cross validation (CV) $R^2$ were 0.82 and 0.60, respectively, under that threshold. Model performances among different spatial clusters differed to a certain extent. High-CV $R^2$ values always exceeded 0.6 while low-CV $R^2$ values less than 0.5 also existed. Both the size of the model-fitting data records and the extent of urban-industrial characteristics of spatial clusters accounted for these differences. The PM2.5 estimates agreed well with the PM2.5 observations with correlation coefficients all exceeding 0.5 at the monthly, seasonal, and annual scales. East of Hu’s line and north of the Yangtze River were characterized by high PM2.5 concentrations. This study contributes to the understanding of how well VIIRS AOD can retrieve ground-level PM2.5 concentrations at the national scale and strategies for building ground-level PM2.5 satellite remote sensing retrieval models.


Abstract: Satellite-retrieved aerosol optical depth (AOD) data have been widely used to predict PM$_{2.5}$ concentrations. Most of their spatial resolutions (~1 km or greater), however, are too coarse to support PM$_{2.5}$-related studies at fine scales (e.g., urban-scale PM$_{2.5}$ exposure assessments). Space-time regression models have been widely developed and applied to predict PM$_{2.5}$ concentrations from satellite-retrieved AOD. Their accuracies, however, are not satisfactory particularly on days that lack a model dataset. The present study aimed to evaluate the effectiveness of recent high-resolution (i.e., ~750 m at nadir) AOD obtained from the Visible Infrared Imaging Radiometer Suite instrument (VIIRS) Intermediate Product (IP) in estimating PM$_{2.5}$ concentrations with a newly developed nested spatiotemporal statistical model. The nested spatiotemporal statistical model consisted of two parts: a nested time fixed effects regression (TFER) model and a series of geographically weighted regression (GWR) models. The TFER model, containing daily, weekly, or monthly intercepts, used the VIIRS IP AOD as the main predictor alongside several auxiliary variables to predict daily PM$_{2.5}$ concentrations. Meanwhile, the series of GWR models used the VIIRS IP AOD as the independent variable to correct residuals from the first-stage nested TFER model. The average spatiotemporal coverage of the VIIRS IP AOD was approximately 16.12%. The sample-based ten-fold cross validation goodness of fit ($R^2$) for the first-stage TFER models with daily, weekly, and monthly intercepts were 0.81, 0.66, and 0.45, respectively. The second-stage GWR models further captured the spatial
heterogeneities of the PM$_{2.5}$-AOD relationships. The nested spatiotemporal statistical model produced more daily PM$_{2.5}$ estimates and improved the accuracies of summer, autumn, and annual PM$_{2.5}$ estimates. This study contributes to the knowledge of how well VIIRS IP AOD can predict PM$_{2.5}$ concentrations at urban scales and offers strategies for improving the coverage and accuracy of daily PM$_{2.5}$ estimates on days that lack a model dataset.


**Abstract:** Recent studies on ecosystem services have highlighted the relationship between multiple services. It is widely accepted that the increase in one ecosystem service may alter the provision of another. However, the individual difference and time effect are often difficult to integrate when the relationship is explored. In this study, we took soil erosion control (SEC) and water yield (WY) as examples to analyze relationships between multiple ecosystem services. Firstly, the biophysical values were evaluated using seven series of land use data from 2000 to 2012. Secondly, the spatial relationship was explored using local autocorrelation and the barycenter model on the basis of correlation analysis on regional and watershed scale. Finally, the pooled regression models, fixed effects models, two-way fixed effects models, and random effects models were introduced to explore the relationship of two ecological indicators for considering time effect and individual differences. We concluded that the SEC and WY presented a positive linear correlation on a watershed scale across time, and showed co-occurrence patterns from a spatial perspective. The SEC was positively affected by WY and the year the data were collected in. There were opportunities to enhance co-benefits between SEC and WY to achieve win-win outcomes.

7. Professor Bo-sin Tang

- gave a keynote speech on “Property rights reform and governance of rural community in China” at the 2019 Joint Forum for Land Use Policy – Urban-rural Coordinated Development and Land Use Policy by Cities-Habitat International-Land Use Policy, in Zhejiang University, Hangzhou, China on 27 April 2019, and participated in the Panel Discussion with two other keynote speakers, Prof. Fulong Wu (UCL) and Prof. George Z. Hong (Fordham University).
8. Professor Anthony Yeh and Mr. Xia Chang (PhD candidate)

- Have published a joint paper:

   **Xia, Chang**, Anqi Zhang, Haijun Wang, and **Anthony G.O. Yeh** (2019), *Predicting the expansion of urban boundary using space syntax and multivariate regression model*, *Habitat International*, 86, pp. 126–134. DOI: [https://doi.org/10.1016/j.habitatint.2019.03.001](https://doi.org/10.1016/j.habitatint.2019.03.001)

9. Mr. Xia Chang (PhD candidate)

- Has the following joint papers published:


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**iLab**

1. Dr. Wilson Lu

- Dr. Lu's application to the 41st Round URC PDF/RAP scheme is successful

- Dr. Lu has a paper accepted by Building and Environment.

Abstract: The impacts of buildings on our life, business, and natural environment have fueled a global trend in the building industry to “go green”. This has helped proliferate various green building rating systems (GBRSs) around the world. While previous studies have examined the effects of these systems on such aspects as resources consumption, indoor air quality and property value, little research, if any, has examined their effects on construction waste management (CWM). This study aims to evaluate the effects of GBRSs on CWM, and to understand the causes behind the effects thereof ascertained. Three GBRSs, including the U.S.-developed Leadership in Energy and Environmental Design (LEED), Mainland China’s GB Evaluation Label (GBEL) and Hong Kong’s Building Environmental Assessment Method (BEAM Plus) are selected for comparative study. A combination of desktop archive analysis and semi-structured interviews formed the study’s mixed method approach. Surprisingly, the study reveals that the three GBRSs do not greatly promote superior CWM performance despite their respective CWM targeted credits. Possible causes, as informed by the interviewees, include the design of rating systems themselves, developers’ biases, and lack of incentives to improve CWM. Legal and economic incentives are more decisive drivers of responsible CWM. This paper also provides demonstrable qualitative evidence for legislators and associated bodies to achieve continued improvement in CWM via GBRSs.

- Dr. Wilson Lu’s SPPR project entitled “Boosting Construction Waste Material Sharing in the Guangdong-Hong Kong-Macao Bay Area” has been featured at the HKU Press Release on 28 March 2019 Towards zero waste smart cities in the Greater Bay Area – Establishing a Waste Trade Organisation (WTO) for construction waste materials.

SustainableHDCities

1. Dr. Ren Chao

- Dr. Ren’s joint research proposal which is led by a public health team of Oxford University has been funded by Wellcome Trust. Details are as follows:

Project title: Health and economic impacts of urban heat islands and greenspace starting 1st Jan 2020 (for 3 years)
Total funding: £499,962
Funding source: Climate Change and Health Award, The Wellcome Trust, UK

Dr. Ren is listed as a Co-I to this joint project and she will advise and provide expertise for characterising the urban areas using local climate zones. This project aims to develop land use land cover classification and run the WRFA
modelling to examine the urban heat island effect. The health economics of urban heat island and green space will be also explored.

- Dr. Ren has published the following joint papers:


Abstract: This study examines the spatial-temporal changes of land cover and the surface urban heat island (SUHI) effect in the Pearl River Delta (PRD) region from 2000 to 2015. The Local Climate Zone (LCZ) concept is used, given its standard but comprehensive classification scheme designed for urban climate studies. Firstly, historical LCZ maps of the PRD region were generated using the World Urban Database and Access Portal Tools (WUDAPT) protocol. Secondly, summer mean land surface temperature (LST) during daytime and night-time was retrieved from remote sensing data to analyze the SUHI. Thirdly, the correspondence between the spatial-temporal patterns of LCZ and LST were explored. The results show that urbanization in this region comprises transformation from natural land covers to built types and conversion in the built up, in particular densification and vertical enhancement of existing urban types. The LST in the region increased in general but the spatial pattern of LST increase is affected by the land cover change. LCZ 6 (open low-rise) and LCZ 8 (large low-rise) show the greatest increase in LST. LCZ 4 (open high-rise) and LCZ 8 are the two dominant LCZs in high SUHI zone and LCZ 8 keeps growing as the most principal LCZ type.

(ii) KKL Lau, SC Chung, C Ren (2019) Outdoor thermal comfort in different urban settings of sub-tropical high-density cities: An approach of adopting local climate zone (LCZ) classification, Building and Environment, 154, pp. 227-238. DOI: https://doi.org/10.1016/j.buildenv.2019.03.005

Abstract: Outdoor thermal comfort is determined by urban morphology and the geometry of outdoor urban spaces. The local climate zone (LCZ) classification system aims to characterise the urban and rural land cover based on various urban morphological parameters. It has been widely used in studies of the thermal environment, but the subjective thermal perception between LCZ classes has rarely been studied. This study evaluated the microclimatic conditions and subjective perception of the thermal environment in eight LCZs in Hong Kong, using questionnaire surveys and field measurements. An ANOVA test showed that the microclimatic conditions were significantly different across eight LCZs, and this could be attributed to the urban morphology and the geometry of the outdoor urban spaces. This does not only affect the critical conditions but also the variations in the thermal environment. The highest maximum temperature (38.9 °C) was found in LCZ 1, and the lowest maximum temperature (29.9 °C) was observed in land cover LCZs. Subjective assessment showed that compact or high-rise settings were associated with warmer thermal sensations reported by the respondents. The relationship between the level of thermal stress and subjective thermal sensation changed across LCZs. This study demonstrated that the LCZ classification provides a characterisation of both the physical and thermal environment. It is also one of the first attempts to examine the relationship between the thermal environment and subjective perceptions using the LCZ
classification system. Further work is required to investigate how thermal comfort indicators can be used to represent the thermal comfort conditions in different LCZs.


Abstract: Particulate matter that <2.5 µm in aerodynamic diameter (PM2.5) has been recognized as one of the principal pollutants that degrades air quality and increases health burdens. In this study, we employ the MLR and GWR modelling method to obtain estimation models for PM2.5 with a set of land use/landscape metrics as predictor variables. The study focused on investigating the influence of urban land use and landscape pattern on PM2.5 spatial variation, specifically, on identification of influential landscape classes/types that regulate PM2.5 concentration levels. The spatial PM2.5 concentration in the compact urban scenario of Hong Kong was sampled by conducting a series of mobile monitoring campaigns. The Local Climate Zone (LCZ) Scheme and World Urban Database and Portal Tools (WUDAPT) level 0 database were adopted as the basis of the calculation of land use/landscape metrics. These metrics were then adopted as the predictors to explain the spatial variations in PM2.5. 62% of the variance in PM2.5 can be explained by the resultant GWR model using only five land use/landscape classes, and without using any traffic-related variables or data from emission inventory. The findings can inform the urban planning strategies for mitigating air pollution and also indicate the usefulness of LCZ and WUDAPT in estimating the spatial variation of urban air quality.


Abstract: To better understand the relationship between energy consumption, and prevailing climatic condition, the present study uses Hong Kong’s observed air temperature records, end-use electricity consumption, and population datasets to: (a) investigate the spatial pattern of cooling energy requirement i.e. cooling degree days on a typical normal and extremely hot summer day using co-kriging geospatial mapping technique; (b) analyze the annual trend of cooling degree days in the city; and (c) quantify the impact of extreme heat events on the summer cooling energy requirements. Results revealed reasonable predictability of city-wide cooling degree days with the co-kriging method which uses two covariates i.e. “elevation of the weather station” and “building volume density within the 1000m radius neighboring area”. Homogeneity and heterogeneity in cooling degree days’ distribution were found during the summer daytime and nighttime, respectively indicating the method’s ability to delineate the urban heat island effect with increased magnitude during extreme heat events. Quantitatively, the extreme heat events increased cooling degree days by 80 – 140% depending on the event type, a range consistent in recent years (2011 - 2015). Lastly, we provided the implications of our findings to building and urban design; and future energy planning.
2. Dr. Guibo Sun, Dean Chris Webster and Dr. Xiaohu Zhang

- has a paper accepted for publication at Environment and Planning B: Urban Analytics and City Science.

**Guibo Sun, Chris Webster, Xiaohu Zhang** (2019). Connecting the city: A three-dimensional pedestrian network of Hong Kong Environment and Planning B: Urban Analytics and City Science (accepted)

**Abstract:** The purpose of the paper is to investigate how a three-dimensional (3D) pedestrian network reshapes connectivity and helps to integrate the built environment of high-density cities. Using the case of Hong Kong, firstly, we elaborate how a continuous 3D network constitutes an entirely different urban morphological spatial hierarchy compared to 2D because of the footbridge system, underground connected with metro stations, and paths connected with mall developments. Secondly, we construct a 3D pedestrian network model classifying segments into 23 categories with multi-height levels (e.g., sidewalk, footbridge, underground, crosswalk, ramp, paths on the building roof). Then we map the 3D network for Hong Kong territory in a geographic information system (GIS), finding that the 3D pedestrian network is 2.4 times in length and 8.5 times in link size greater than the road network. Connectivity comparison through a betweenness measure found striking differences between the two networks, and indicated that footbridges and underground links could enhance walkability when they are well connected with the ground-level networks. Since road networks are widely used as a proxy for pedestrian analysis, we suggest that active travel optimisation planning, especially in high-density cities, requires a bespoke 3D pedestrian model. The 3D pedestrian network, enabling multi-level city living in a vertical metropolis, is a fundamental consideration in urban planning and design practices for high-density cities.

3. Dr. Guibo Sun

- Has published a co-authored paper:

Linchuan Yang, Xu Wang, **Guibo Sun** & Yuan Li (2019): Modeling the perception of walking environmental quality in a traffic-free tourist destination, Journal of Travel & Tourism Marketing.
DOI: [https://doi.org/10.1080/10548408.2019.1598534](https://doi.org/10.1080/10548408.2019.1598534)

**Abstract:** This study aims to determine how tourists perceive the quality of a walking system in a traffic-free destination. We conducted a questionnaire survey on tourist satisfaction with attributes and overall performance of the walking system at Kulangsu (China) in October 2017 and February 2018. We developed an ordered probit model to evaluate the relative importance of each attribute by employing the pooled cross-sectional data. Results show that the attributes that need an enhancement in the view of tourists are the level of crowding and cleanliness. The two attributes have not been pointed out in previous literature. Accordingly, policy implications are proposed. The findings enhance our understanding of tourist satisfaction with the walking system.