INFORMATION ARCHITECTURE OF CITIES

09

Information Architecture and Future Cities

Understanding a city is fundamental for the meaningful design and management of a city. “Information Architecture and Future Cities” opens a holistic view on existing and new cities, with focus on Asia. The goal is to better understand the city by going beyond the physical appearance and by focusing on different representations, properties and impact factors of the urban system. We explore the city as the most complex human-made organism with a metabolism that can be modelled in terms of stocks and flows. We investigate data-driven approaches for the development of the future city, based on crowd sourcing and sensing. You will learn to see the consequences of citizen science and the merging of Architecture and information space. The course describes origins, state-of-the-art, and applications of information architecture and simulation. Both rapidly gain importance in the design of buildings, cities and territories. As course requirement, there will be three short exercises.

Where

HIT F 22 (Value Lab)

Supervision

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Denise Weber denise.weber@arch.ethz.ch
Dongyoun Shin shin@arch.ethz.ch

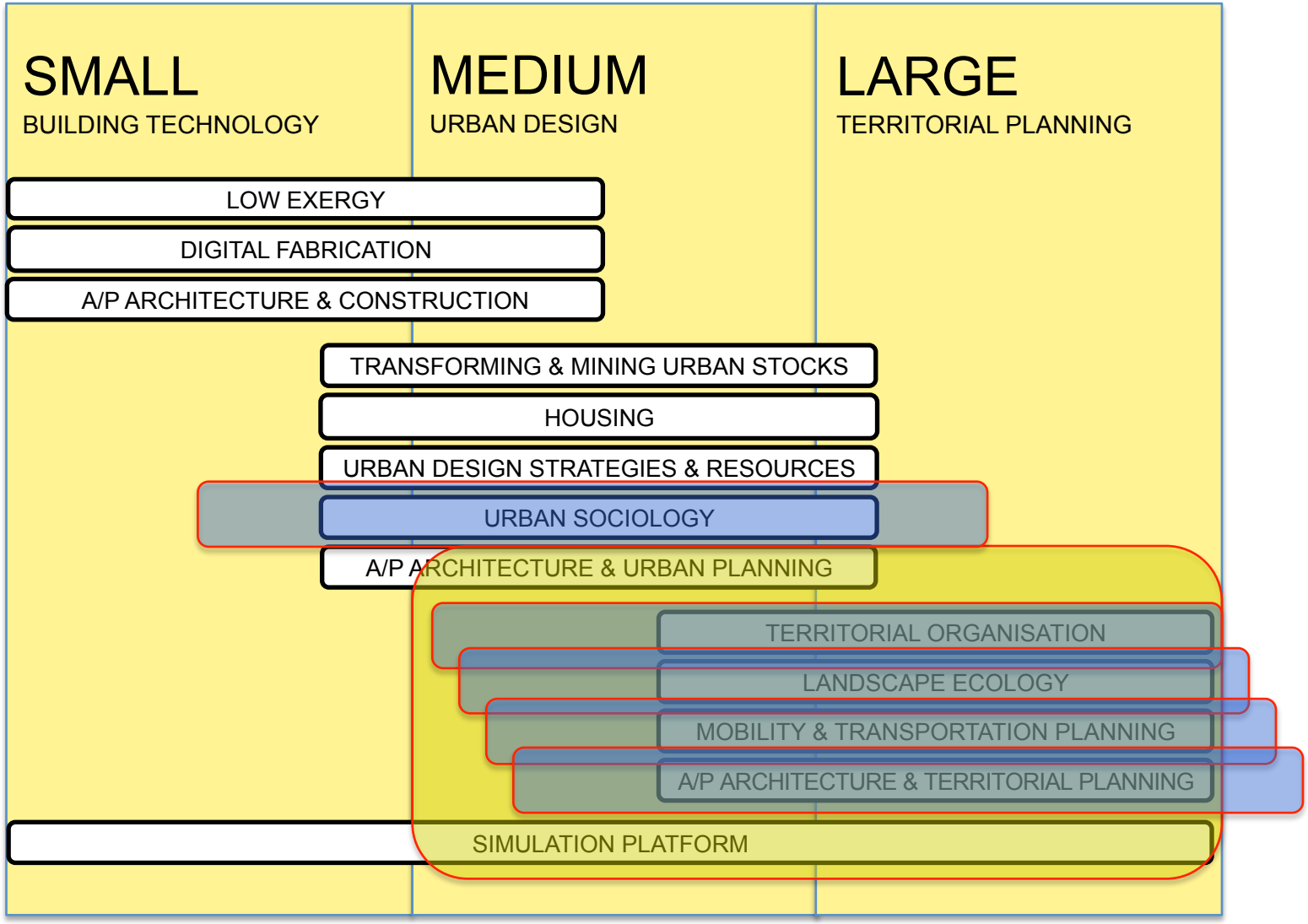
22.09.2014	**Einführung und Überblick.** Introduction and Overview
29.09.2014	**Das System Gebäude – Klima.** Building as a System - Climate (Guest Lecture by Estefania Tapias)
06.10.2014	**Das System Gebäude - Konstruktion.** Building as a System - Habitat (Guest Lecture by Prof. Dirk Hebel)
13.10.2014	**Das System Gebäude – Energie & Habitat.** Building as a System - Energy & Habitat
20.10.2014	Seminar week (No lecture)
27.10.2014	**Das System Stadt - Soziologie.** City as a System - Social Science (Guest Lecture)
03.11.2014	**Stocks & Flows - Wasser & Material.** Stocks & Flows - Water & Material
10.11.2014	**Das System Stadt - Entwurf.** City as a System - Design
17.11.2014	**Stocks & Flows - Menschen & Informationen.** Stocks & Flows - People & Information (Guest Lecture by Matthias Standfest)
24.11.2014	**Das System Territorium - Mobilität.** Territory as a System - Mobility
01.12.2014	**Das System Territorium - Organisation.** Territory as a System - Organization (Guest lecture by Prof. Dirk Hebel)
01.12.2014	**Final iA critique** **Combined critique with the other iA courses** (14:00 - 18:00)

Territory System - Mobility

- Exercise 2 Results and Course Evaluation
- Territory as a System
- Agent Based Modeling
- The Zürich Model: Metrobuzz
- The Singapore Model: Realtime
- Exercise 3

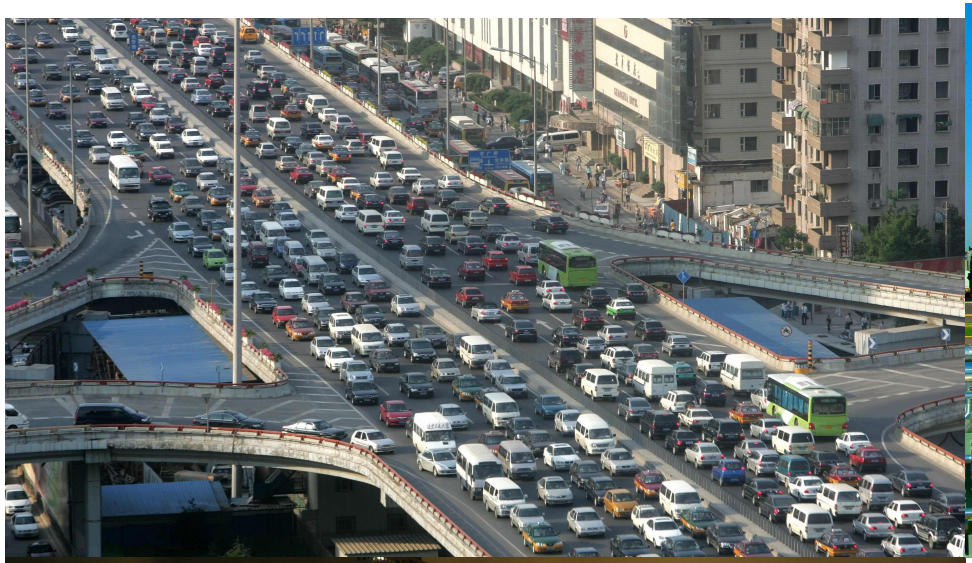
Scales, Stocks and Flows

SPACE
ENERGY
MATERIALS
PEOPLE
CAPITAL
WATER
INFORMATION

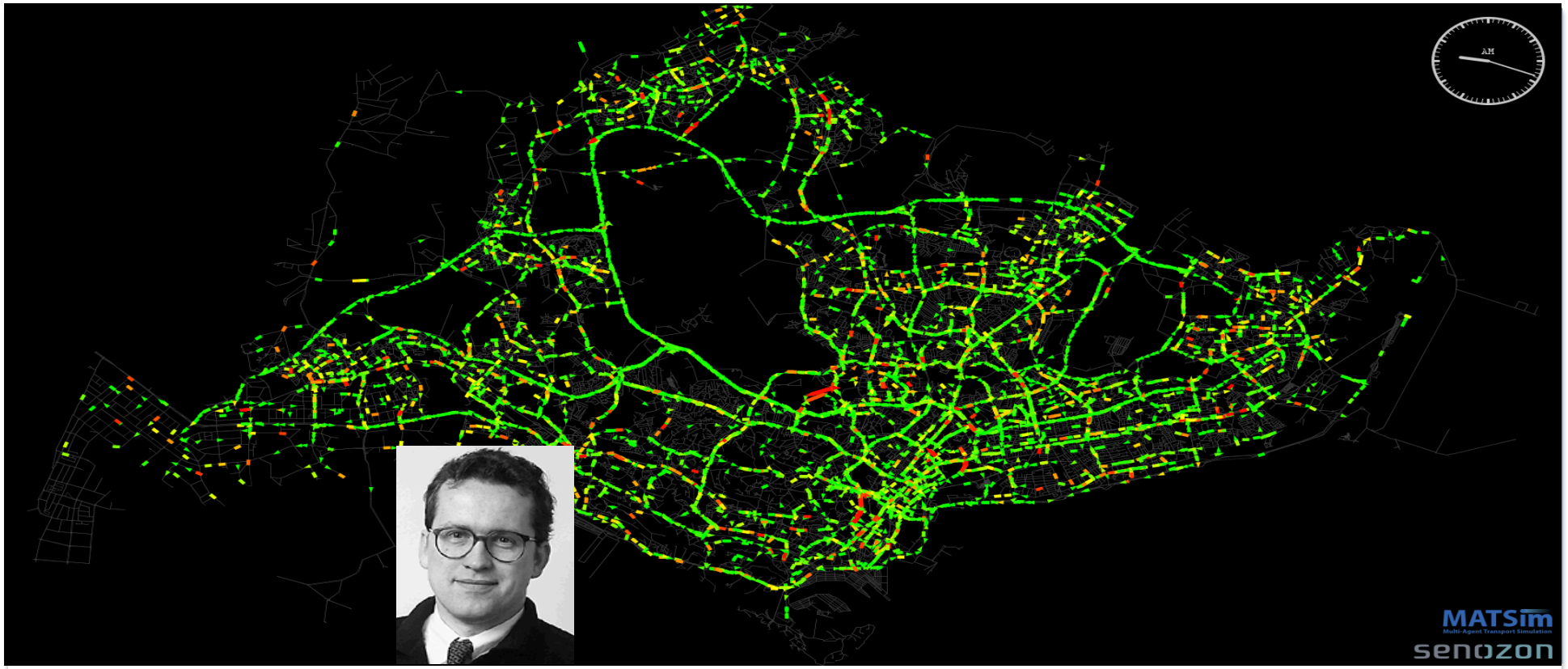


Systems

A **system** defines a set of objects acting together as part of a whole. In the urban context, a system contains buildings, infrastructure, landscape, water and other elements as its parts. Taken together, and adding their individual behaviour and multiple interactions, they form a complex system. Complex systems theory is an important field of science. Its findings are applied to many areas, including urbanisation.




VIOLET



Mobility & Transportation Planning

Studying urban transport systems to maximize efficiency.

Prof. Dr. Kay Axhausen

Image source: Module VIII

Mobility: Lessons learnt from Jakarta, Singapore and Zurich

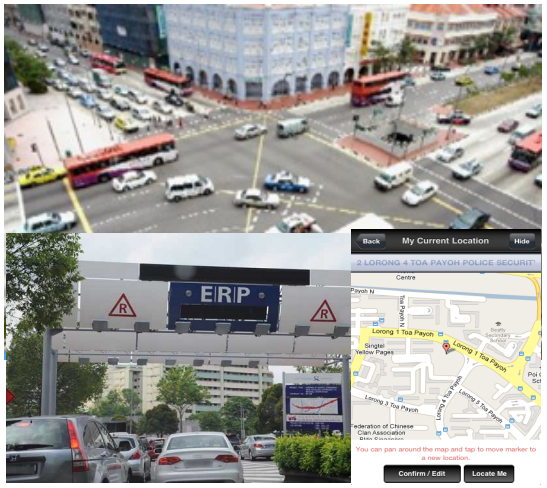
Jakarta

Plan: Ground-breaking for new subway system (Apr 2013), BRT with 700 new buses.

Fuel subsidies.

“I work on my Blackberry in the traffic jam. I want my own car plus driver.”

Singapore



Plan: MRT planning (since 1982), Extension of MRT network to 5 – 10 min walk from every home, Efficient use of streets and cars (ERP 2), real-time analysis.

“I use MRT and Taxi. I don’t want a new car and prefer to go on holiday instead. It is too hot for cycling and it is dangerous.”

Zurich

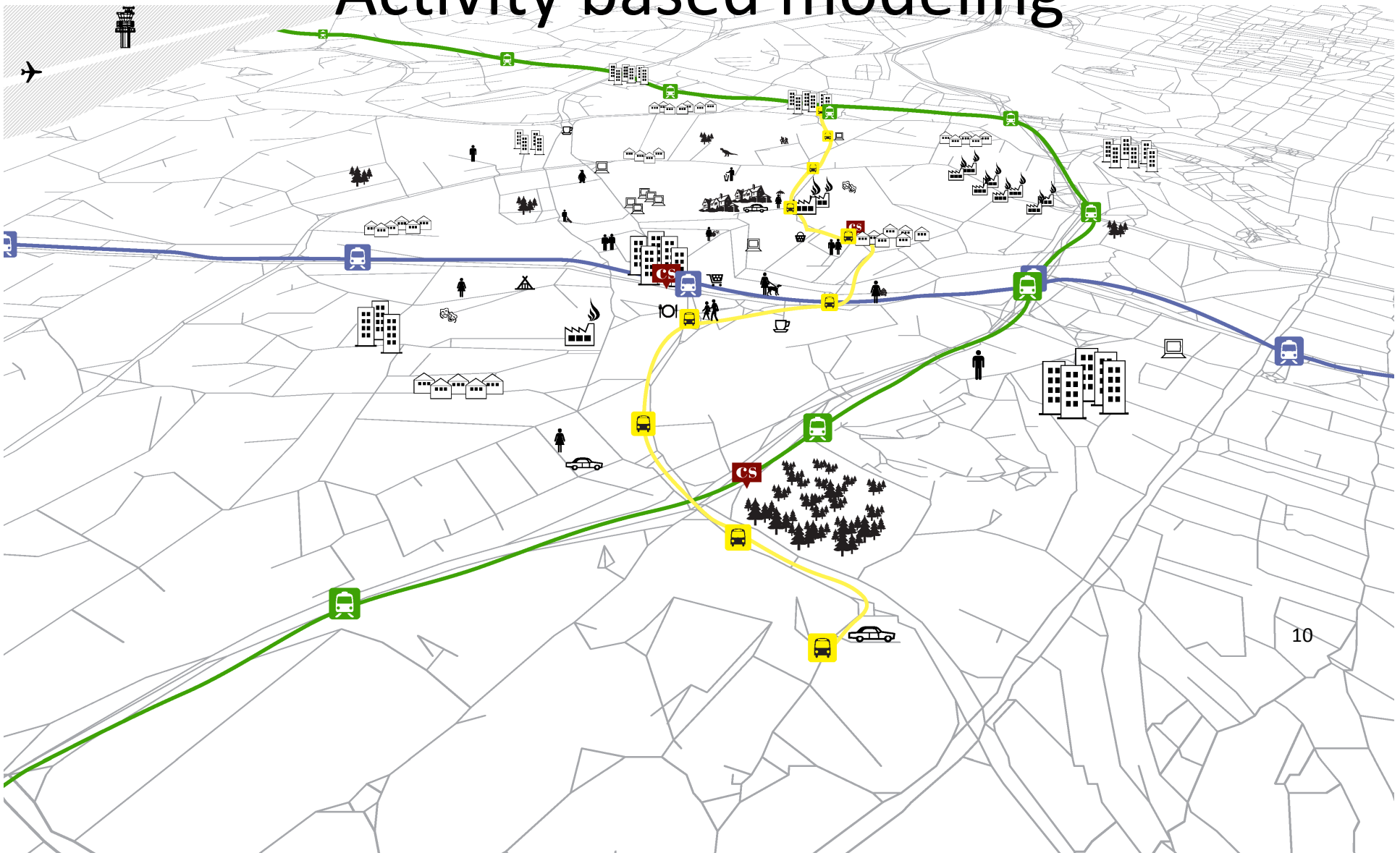
Plan: Car-sharing and multi-modal transportation. Increase connectivity (today, 50% of streets have dedicated bicycle paths).

“ I cycle and use public transport. It is fast, cheap and healthy.

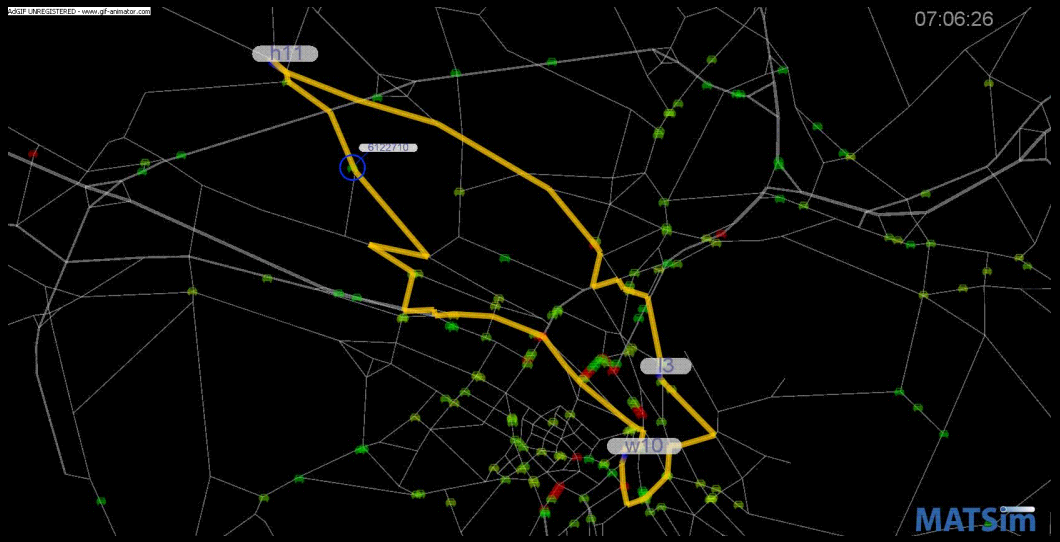
Local transportation simulation

- Agent-based simulation to represent the behaviour of an urban population, using the MatSim programme
- Improving the transportation and mobility situation in emerging cities by developing scenarios
- Integration of simulation and urban planning

Activity based modeling



Agent-based transport demand modelling

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        …
</plan>
</person>
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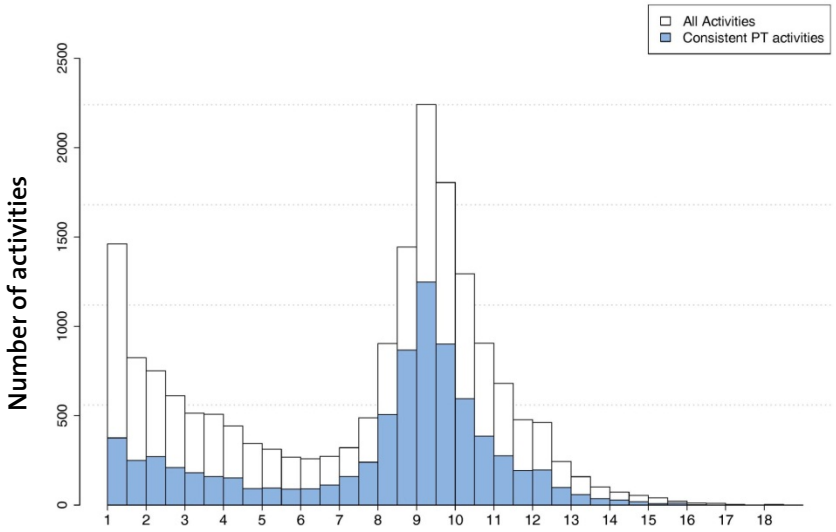
A morning in Singapore with MATSim

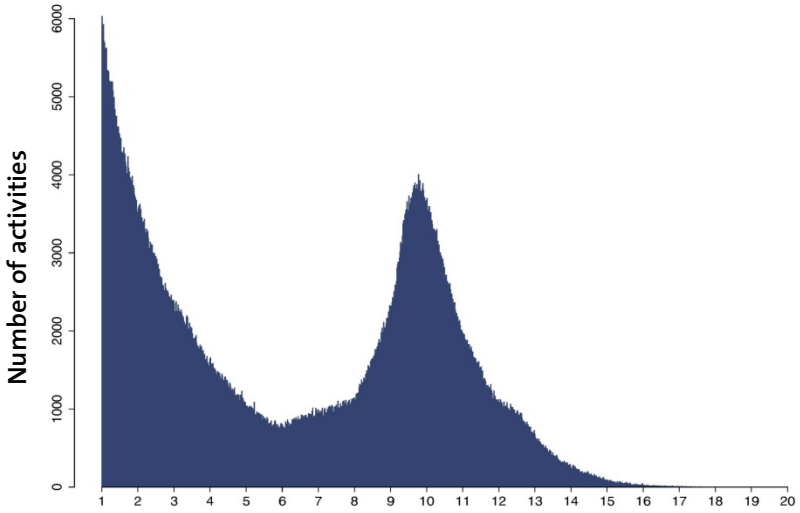
HITS 2008 PT activity durations and EZ-Link activity durations

HITS 2008



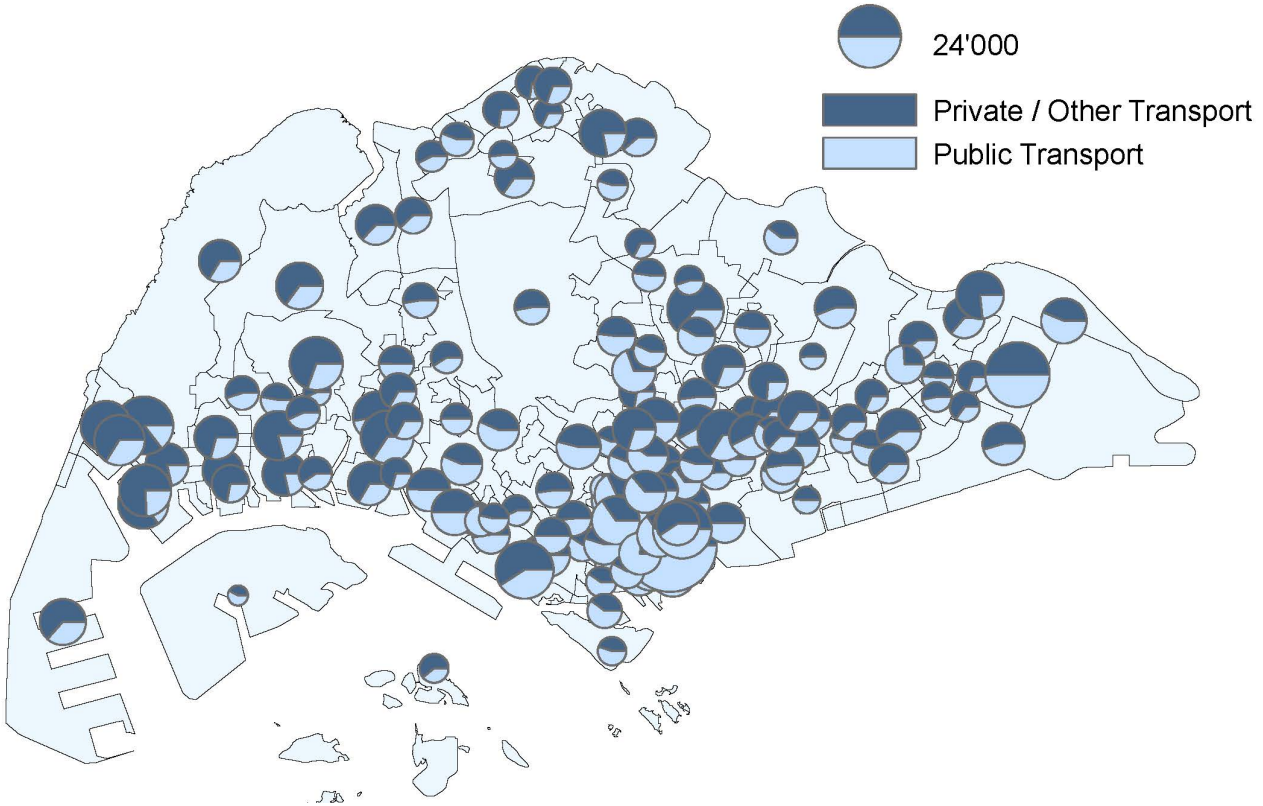
difference arrival time – departure time

EZ Link (one day)

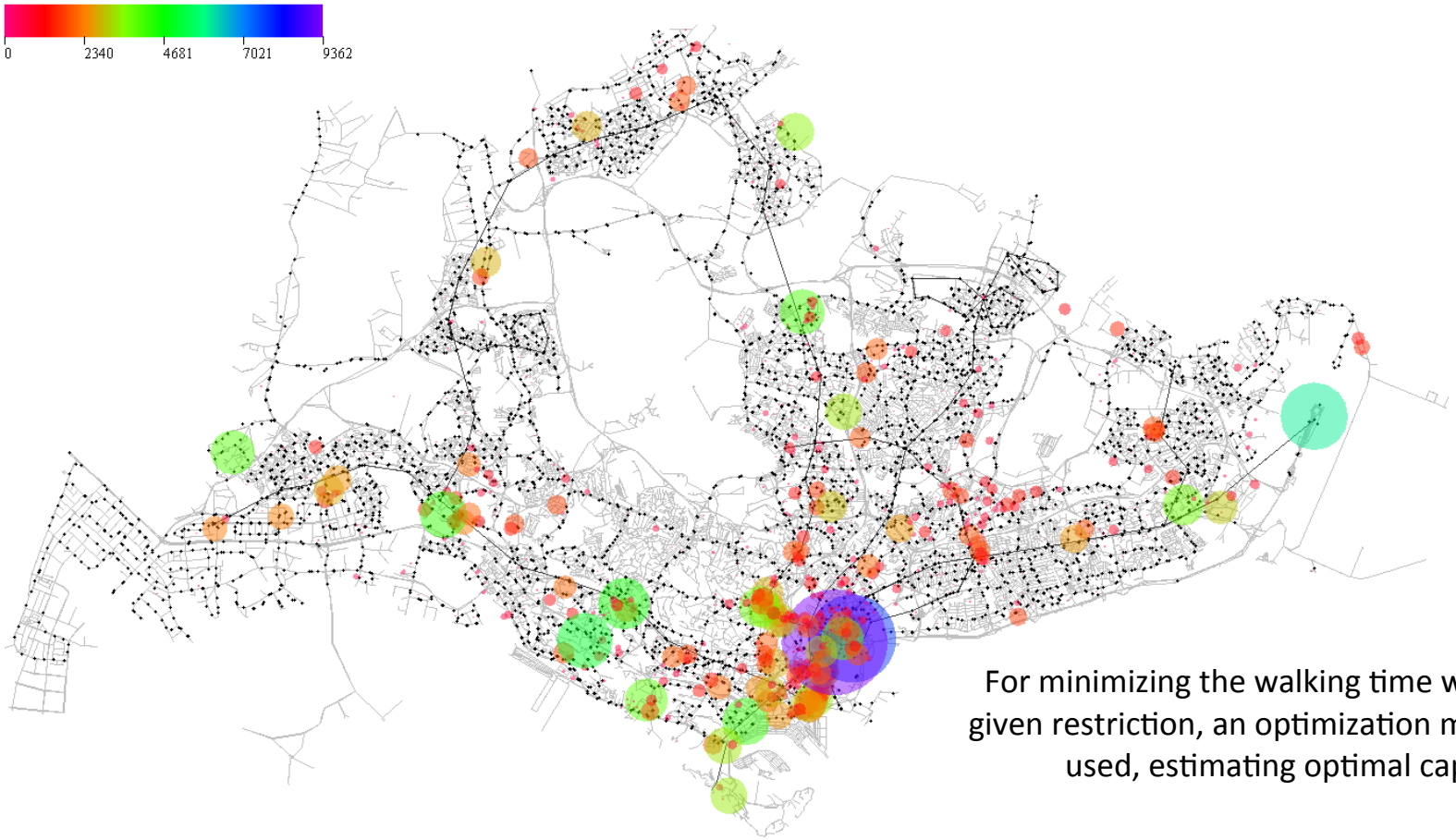


difference arrival time – departure time

Total number of workplaces (162 zones)



Distribution to master plan areas



For minimizing the walking time with the given restriction, an optimization model is used, estimating optimal capacities

Workplace locations in Singapore

Chakirov, A. and A. Erath (2012) Activity Identification and Primary Location Modelling based on Smart Card Payment Data for Public Transport.

Ordonez, S and A. Erath (2012) Estimating Dynamic Workplace Capacities using Public Transport Smart Card Data and a Household Travel Survey

Mobility and Transportation Planning

Planning and Sustainability | MATSim Singapore | Decision Support System | PhD theses | Scientific network

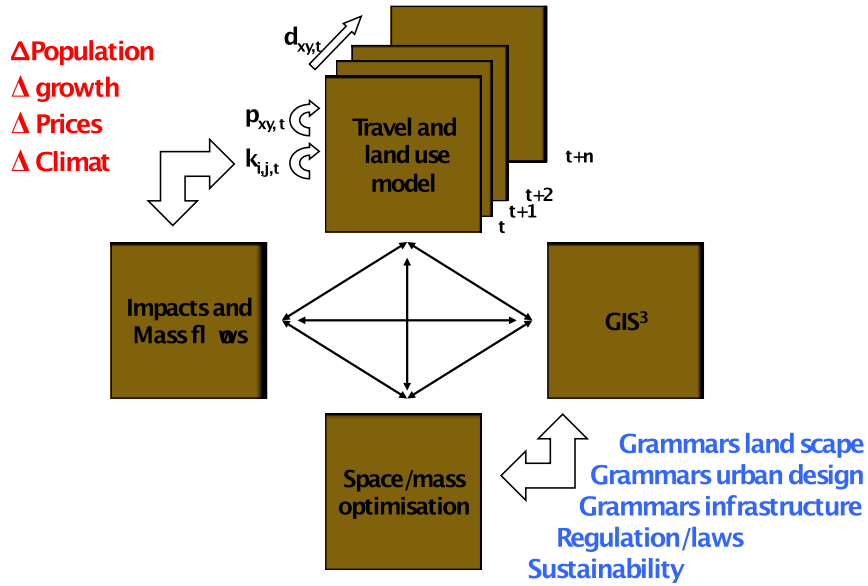
Planning and Sustainability

Extending and adapting MATSim

- Implenting the fast and large scale agent-based simulation
- Tools for faster implementation
- Developing modules without the European assumption in mind
- New links to faster analysis

Thinking about a new equilibrium between ownership and use and urban form

- Summerschool on the urban form
- Abstract models to obtain hints on the generalised cost price points



MATSim Singapore

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Mobility and Transportation Planning

Kay Axhausen

(SEC) SINGAPORE-ETH CENTRE 新加坡－ETH 研究中心

(FCL) FUTURE CITIES LABORATORY 未来 城市 实验室

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Mobility and Transportation Planning

Prof. Dr. Kay Axhausen

CREATE
Campus for Research Excellence And Technological Enterprise

ETH zürich

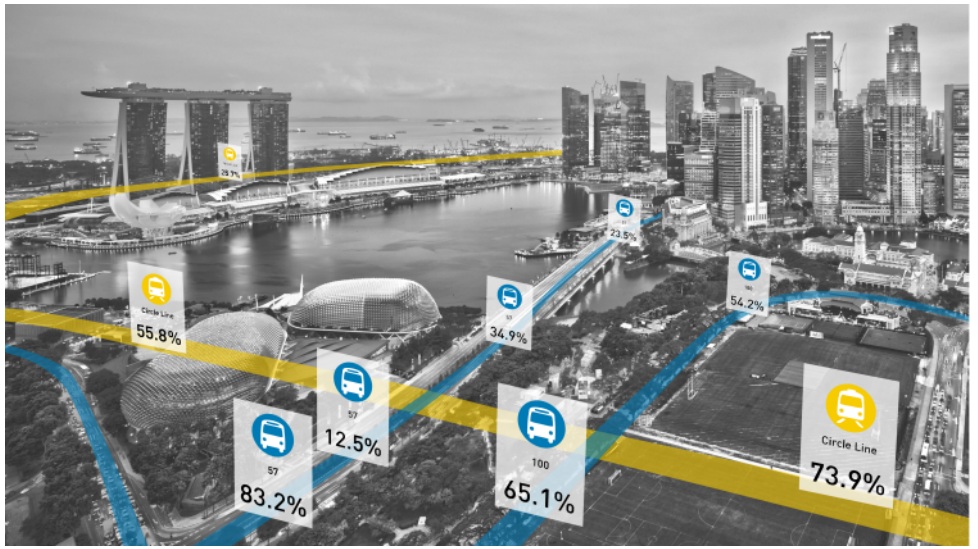
Turning Big Data into Smart Data

The potential of data driven transport planning:

- Intelligent transport systems generate big amounts of public transport data every day.
- Currently, this data is primarily used for ridership analysis and real times information, but not operational planning.

Agent – based transport simulation:

- MATSim simulates urban transport on the level on individuals for entire cities.
- MATSim captures dynamic phenomena such as congestion, bus bunching and overcrowding.



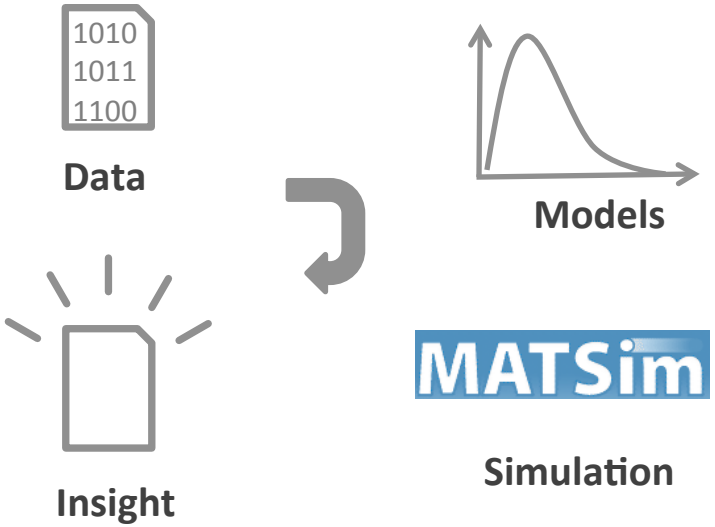
Predictive modelling

Understanding the dynamics of bus operations:

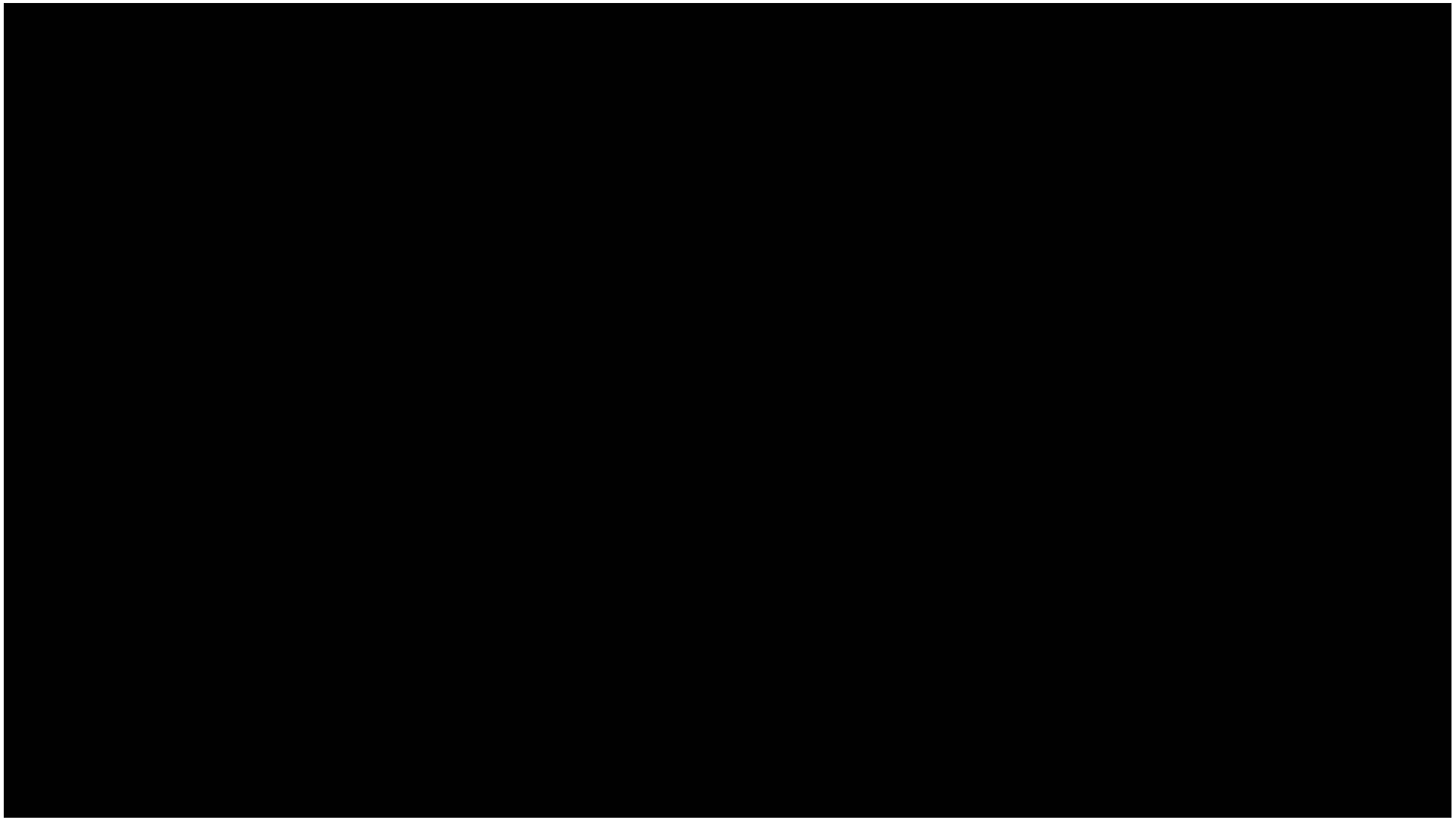
- How much time for boarding and alighting?
- What determines the variability of travel time between stops?

Setting up a MATSim model purely based on Smart Card Data:

- Derive **operational schedules**
- Include **randomness** in simulation
- Analyse from a both the **operator's and commuter's perspective**



Putting everything together



Creating Walkable Places

Why is walking relevant?

- Indispensable mode of transport in cities, but data and academic studies are scarce.
- The most liveable cities are also the most walkable.

Walkability as a strategy

- Singapore's Land Transport Plan 2013 identifies improving walkability as a key goal.
- FCL has been commissioned by URA to research walking behavior and develop evidence-based planning tools.

How to measure walkability?

Existing approaches:

- Transport engineers conventionally are only interested in pedestrian density.
- Walkscore accounts for distances to various amenities, but does not consider walking quality.
- Space Syntax restricts mainly to an analysis of network topology.

Our aim :

- Measure and integrate the quality of the built environment.
- Observe and model behaviour.

Research project with URA

EMBRACING WALKABILITY

(SEC) SINGAPORE-ETH CENTRE 新加坡－ETH 研究中心

(FCL) FUTURE CITIES LABORATORY 未来 城市 实验室

Mobility and Transportation Planning

Prof. Dr. Kay Axhausen

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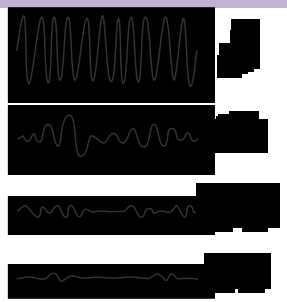
5 minutes
10 minutes

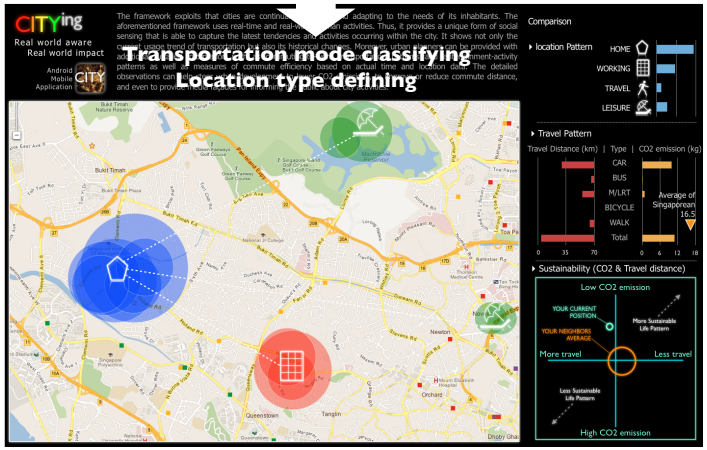
Understanding Cities

Analyzing transportation data

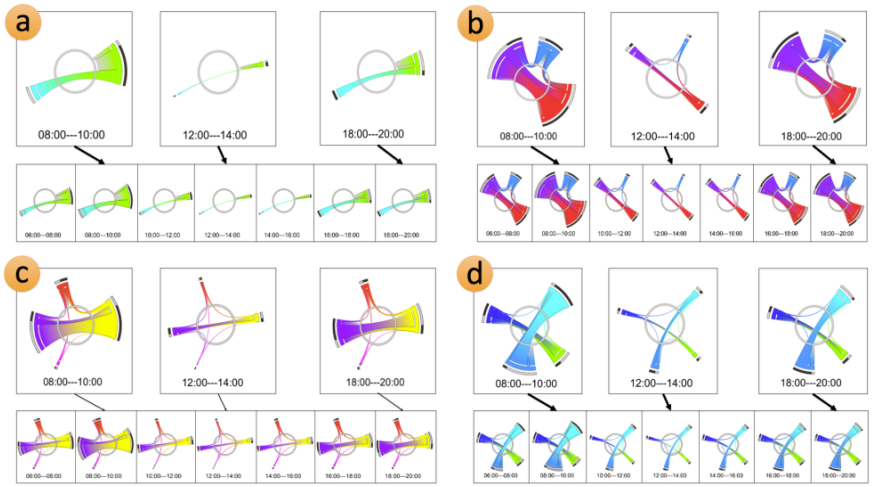
Sensing by mobile application



High Efficiency Vehicle Detecting Algorithm

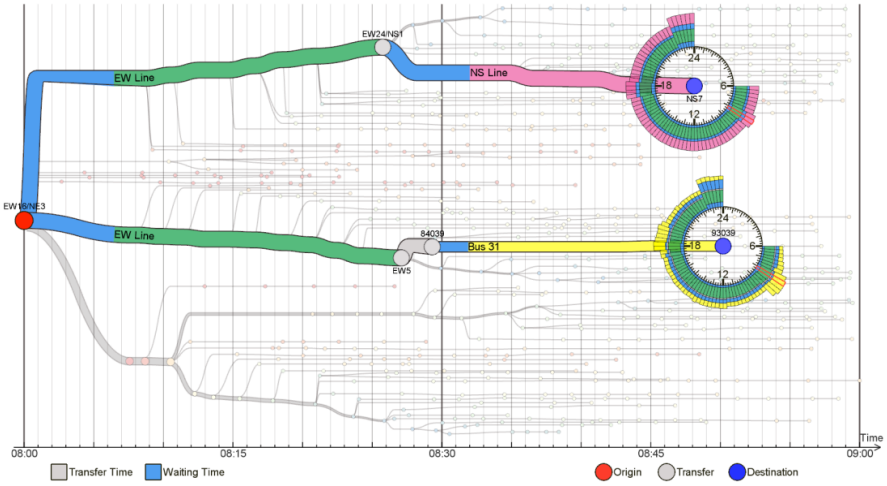


PhD project of Dongyoun Shin



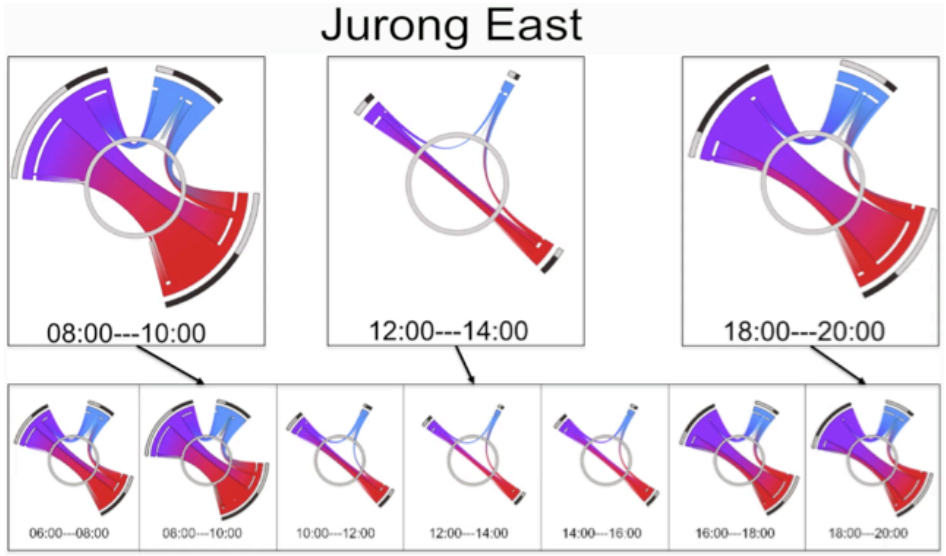
Exploring the temporal interchange patterns at the Singapore Metro system

Analyzing detailed mobility-related factors

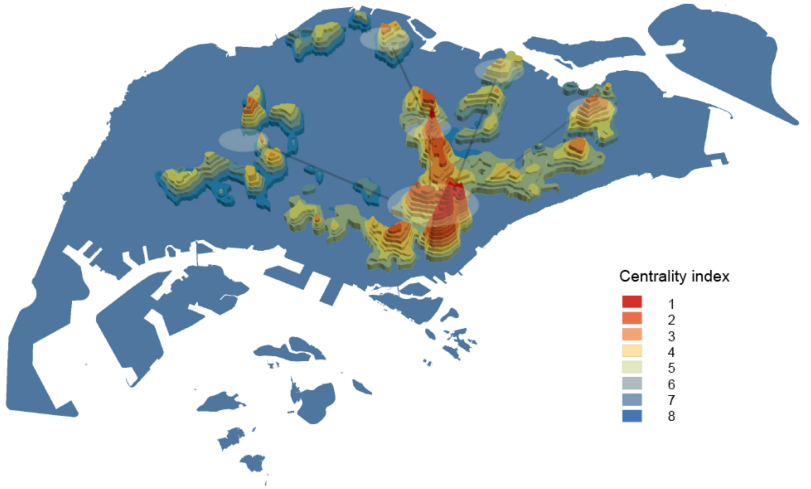


Visual Analytics, Geospatial Analysis, Design and Planning Support

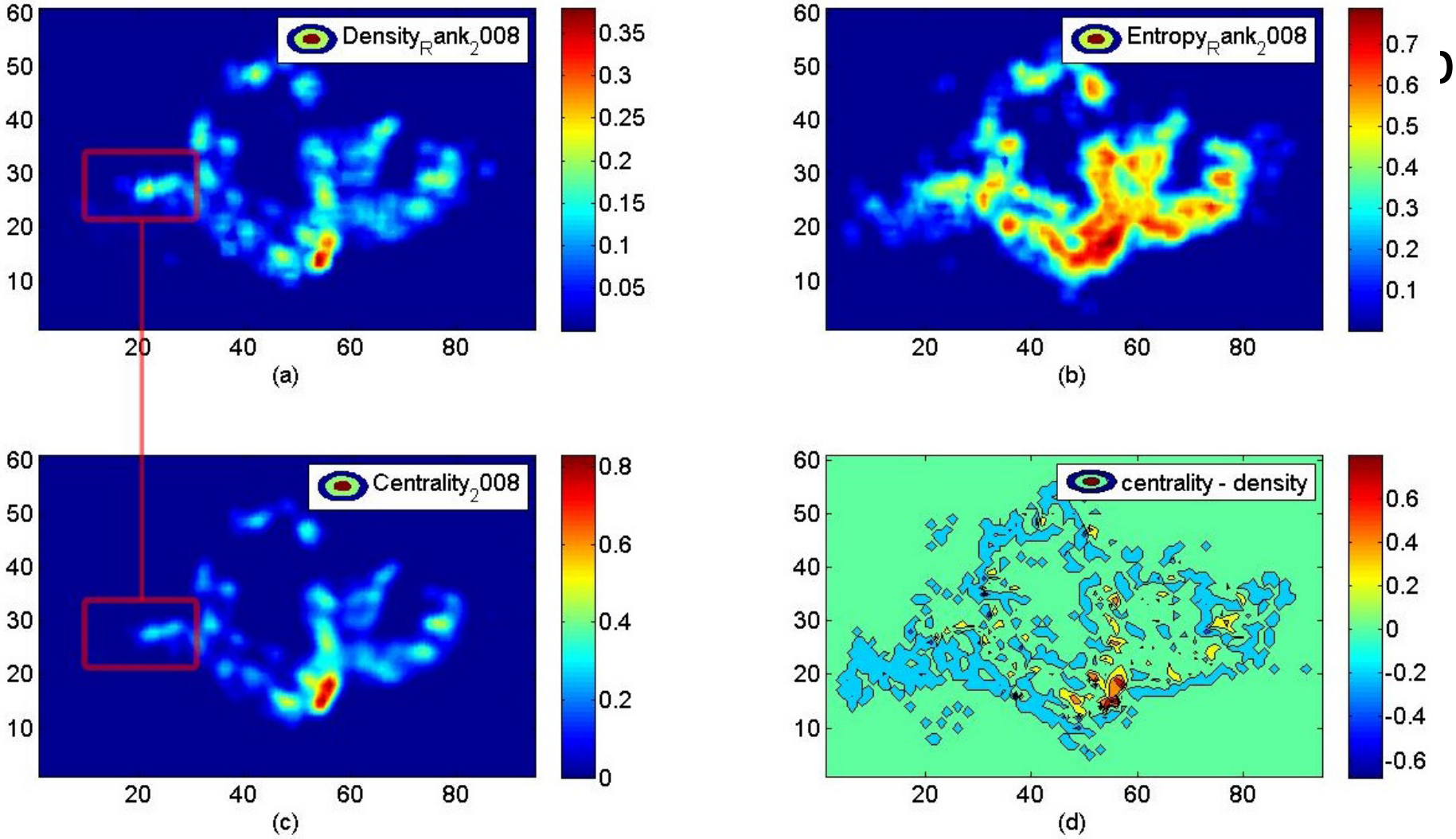
Left: Visualization of temporal interchange pattern changes over a day in the Jurong East station of Singapore Mass Rapid Transit (MRT) system (ZENG Wei). Right: Centrality index detected from transportation data (ZHONG Chen).

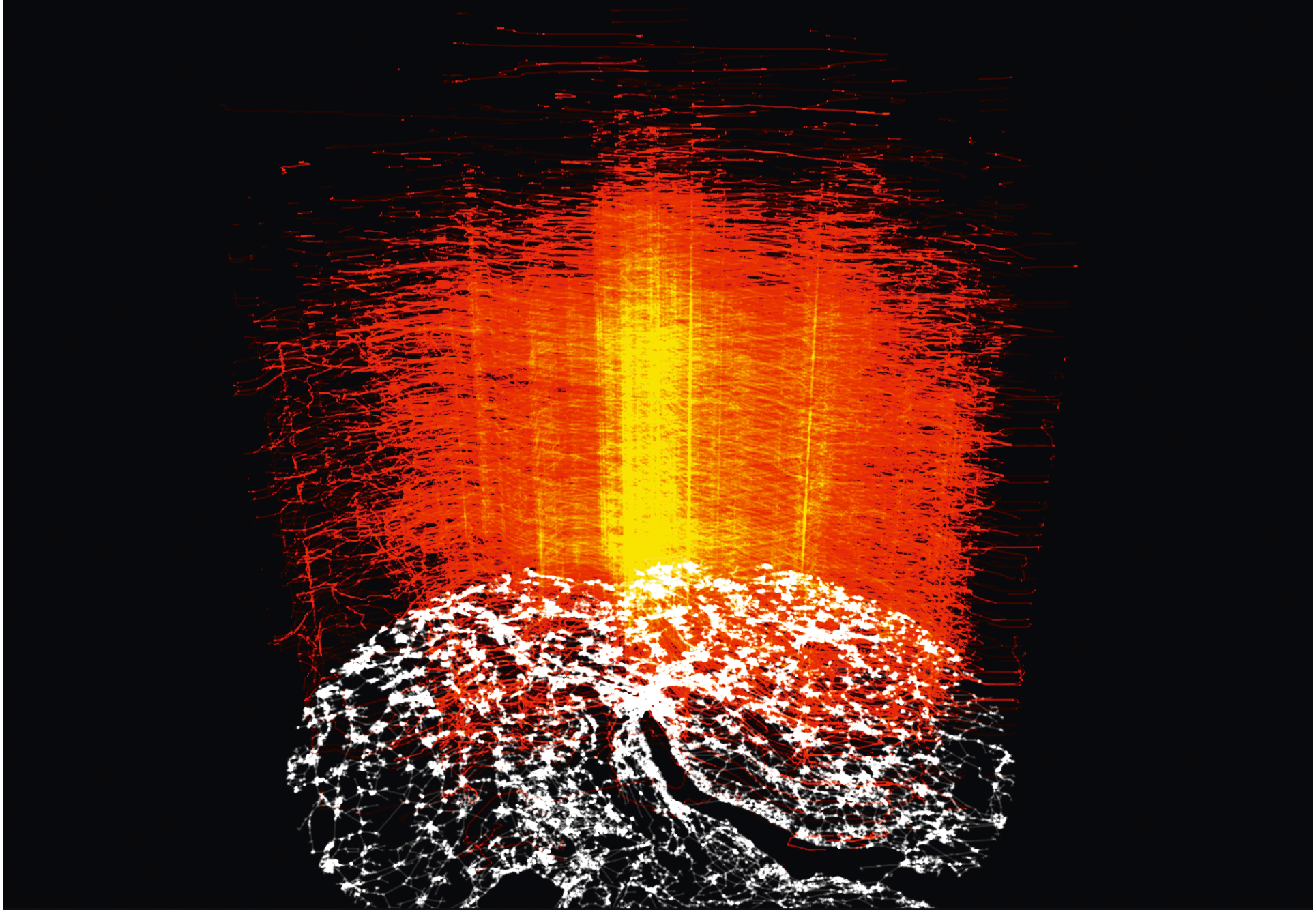


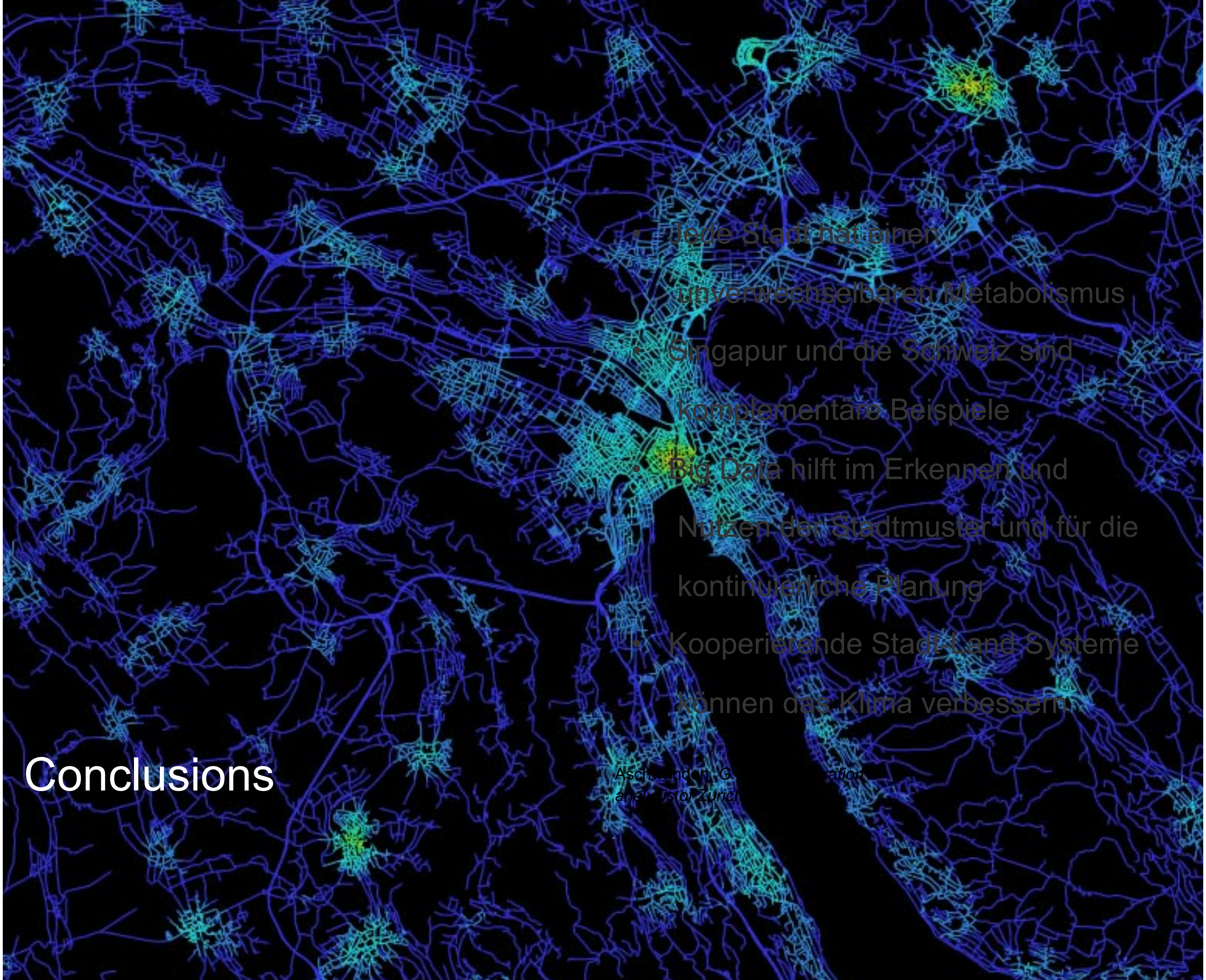
ZENG Wei



ZHONG Chen


Density_Rank_2008
Entropy_Rank_2008
Centrality_2008
centrality - density
(a)
(b)
(c)
(d)

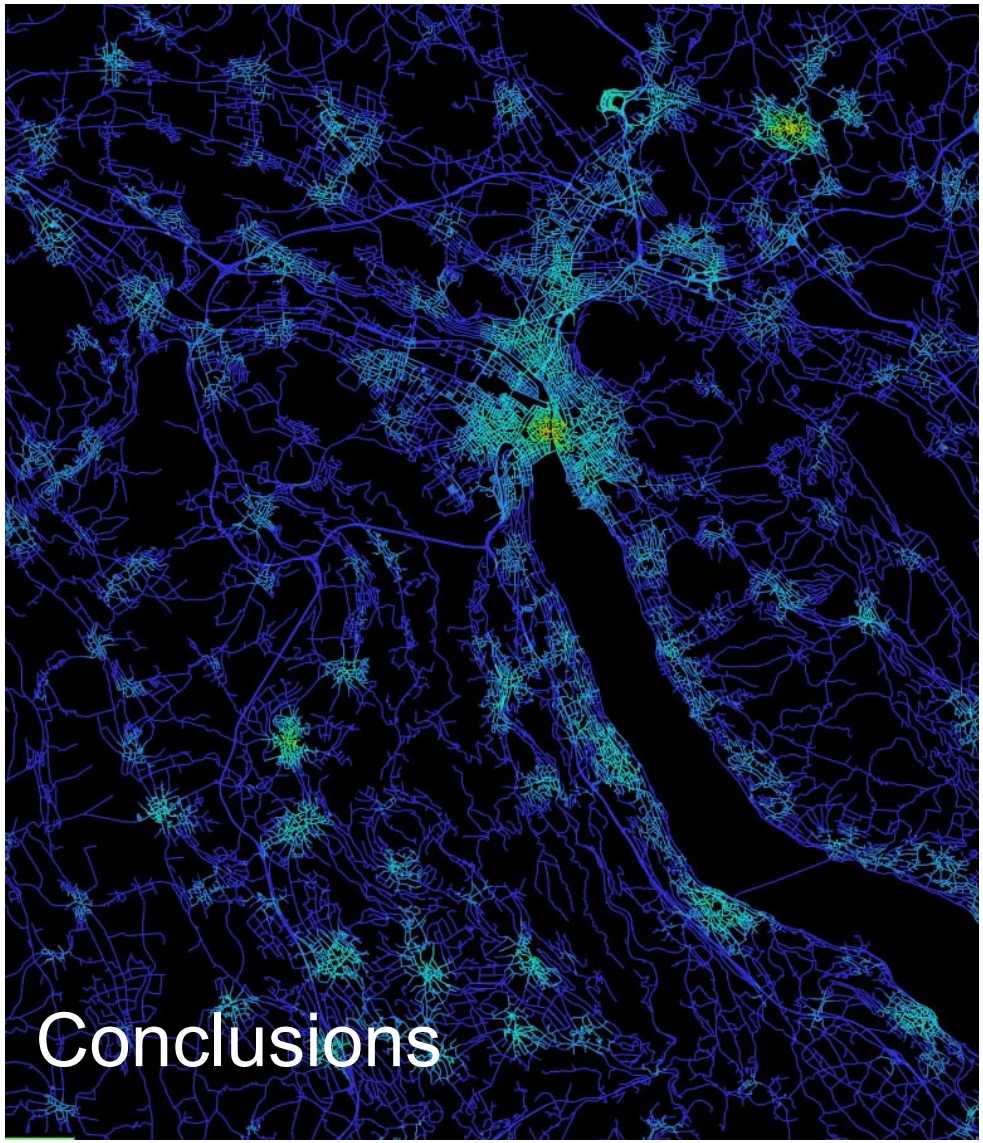




- Jede Stadt hat einen unverwechselbaren Metabolismus
- Singapur und die Schweiz sind komplementäre Beispiele
- Big Data hilft im Erkennen und Nutzen der Stadtmuster und für die kontinuierliche Planung
- Kooperierende Stadt-Land Systeme können das Klima verbessern

Conclusions

Aschwanden, G. ... *ration analysis of Zurich*



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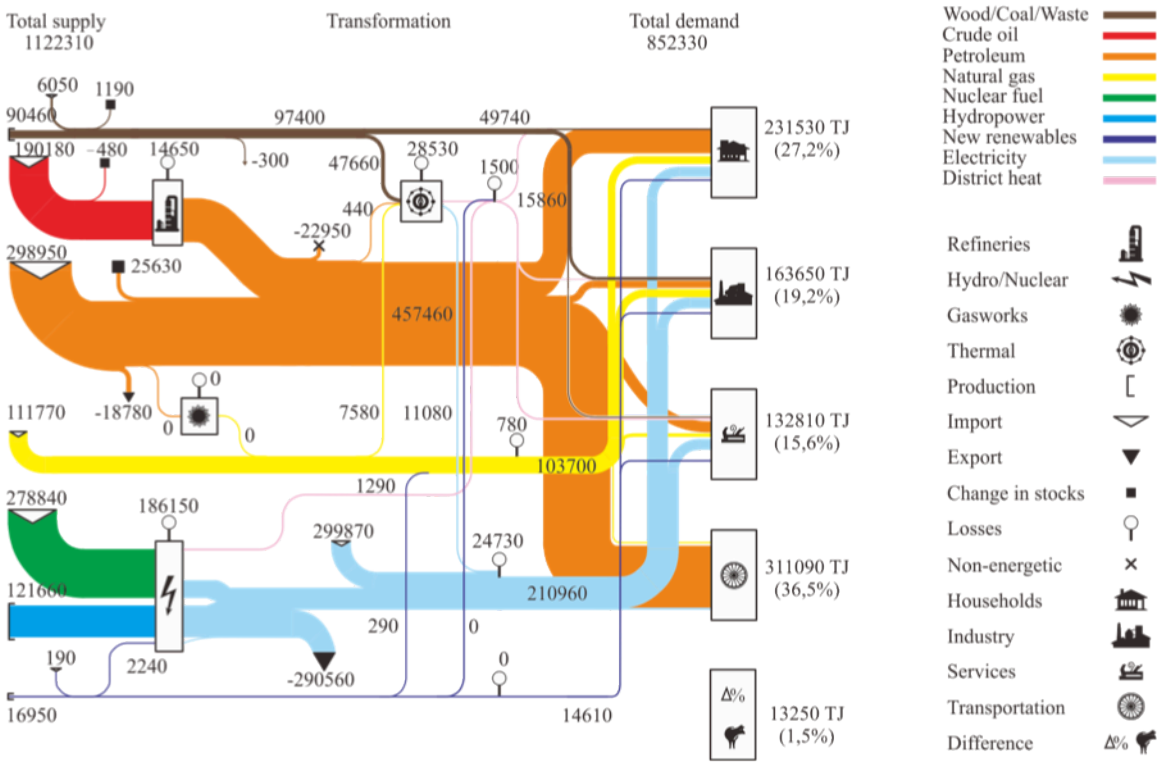
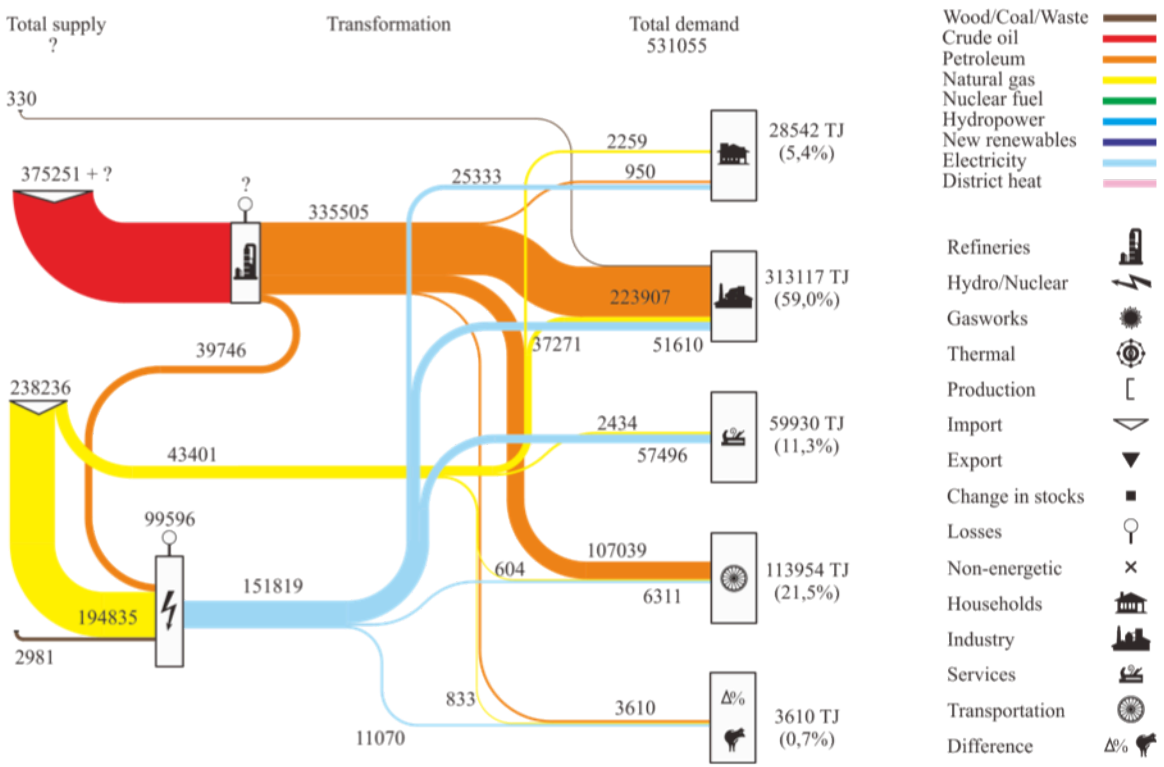
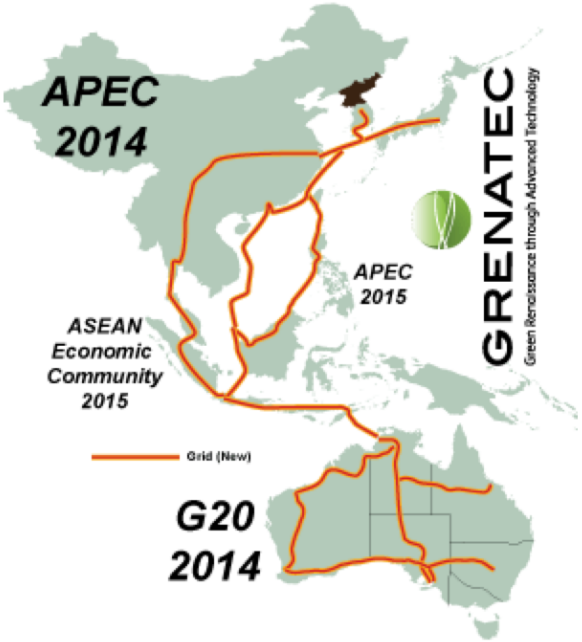
Aschwanden, *G. 2013. Integration analysis of Zurich region.*


Total supply
1122310
Transformation
Total demand
852330
6050
1190
90460
97400
49740
190180
-480
14650
-300
47660
28530
1500
15860
440
-22950
298950
25630
457460
111770
-18780
0
0
0
7580
11080
780
103700
278840
186150
1290
299870
24730
121660
210960
290
0
190
2240
-290560
0
16950
14610
231530 TJ
(27,2%)
163650 TJ
(19,2%)
132810 TJ
(15,6%)
311090 TJ
(36,5%)
13250 TJ
(1,5%)
Wood/Coal/Waste
Crude oil
Petroleum
Natural gas
Nuclear fuel
Hydropower
New renewables
Electricity
District heat
Refineries
Hydro/Nuclear
Gasworks
Thermal
Production
Import
Export
Change in stocks
Losses
Non-energetic
Households
Industry
Services
Transportation
Difference


Total supply
?
Transformation
Total demand
531055
330
375251 + ?
?
335505
25333
2259
950
28542 TJ
(5,4%)
313117 TJ
(59,0%)
223907
39746
37271
51610
238236
43401
2434
57496
59930 TJ
(11,3%)
99596
107039
604
113954 TJ
(21,5%)
151819
194835
6311
2981
833
3610
3610 TJ
(0,7%)
11070
Δ%
Wood/Coal/Waste
Crude oil
Petroleum
Natural gas
Nuclear fuel
Hydropower
New renewables
Electricity
District heat
Refineries
Hydro/Nuclear
Gasworks
Thermal
Production
Import
Export
Change in stocks
Losses
Non-energetic
Households
Industry
Services
Transportation
Difference

Both China and Australia want to encourage **economic growth, infrastructure investment, cross-border integration** and **market efficiency**.

2014:
Year of a
Pan-Asian Energy Infrastructure?



This year's APEC and G20 meetings could lay the foundations for a Pan-Asian Energy Infrastructure.

This can be achieved through building a ***Pan-Asian Energy Infrastructure***. It would be comprised of interconnected cross-border power lines, natural gas pipelines and fiber optic cables.

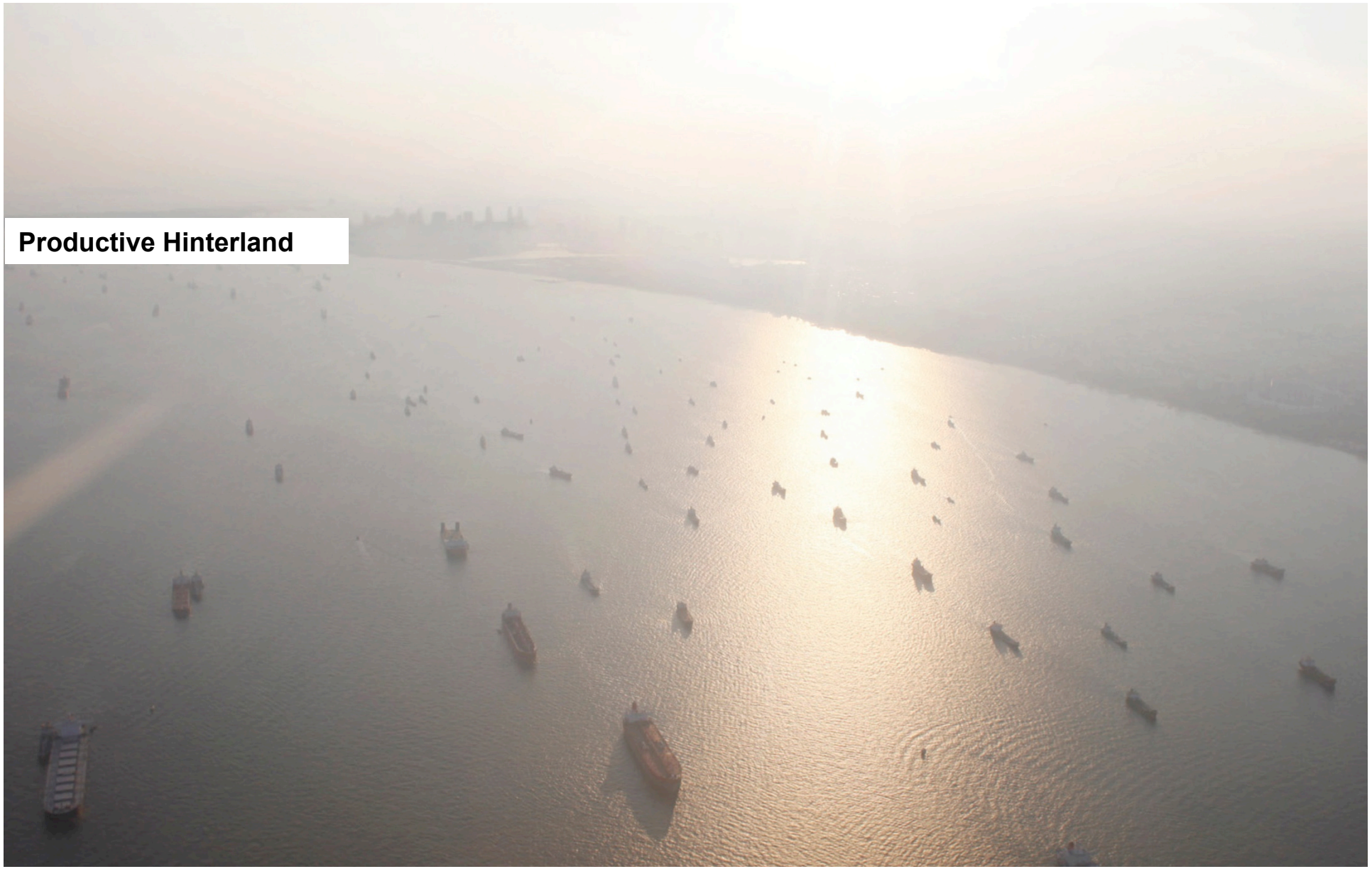
*"**Between 2010 and 2020, Asia needs to invest approximately $8 trillion** in overall national infrastructure."*
"Infrastructure For a Seamless Asia,"
Asian Development Bank, 2009

*"(Asia) must **advance the interconnection of electric grids** across borders to realize maximum efficiency in power generation and delivery."*
"Asian Development Outlook 2013: Asia's Energy Challenge,"
Asian Development Bank

*"The **Trans-ASEAN Gas Pipeline** aims to interconnect the gas pipeline infrastructure of ASEAN Member States and to enable gas to be transported across the borders of the Member States.*
*The **Trans-ASEAN Power Grid,** on the other hand, ensures that gas for power is also being optimized with other potential sources of energy."*
"ASEAN Plan of Action for Energy Cooperation 2010-2015."

"If (national electricity) grids were linked up properly,** in a large integrated energy market, then the **peaks and troughs** (of renewable energy generation)**would** be likely to **even out."
The Economist

Productive Hinterland



Hinterland

Section 3

HS 2014 - Exercise 3

TERRITORIAL SCALE

Territories contain cities, cities contain buildings. Yet they do not form a hierarchical system, as the interaction between buildings influences the city as much as the interaction between cities influences the territory. Rather, territories interact with cities and urban systems, if we consider them as entities with a metabolism and that they are functioning in the analogy to the stocks and flows model.

In this exercise you are encouraged to question the traditional definitions and roles of buildings, cities and territories, as novel non-urbanised high-density settlements will significantly influence our future habitat, as well as the architectural and urban design profession.

Non-urban Information Cities

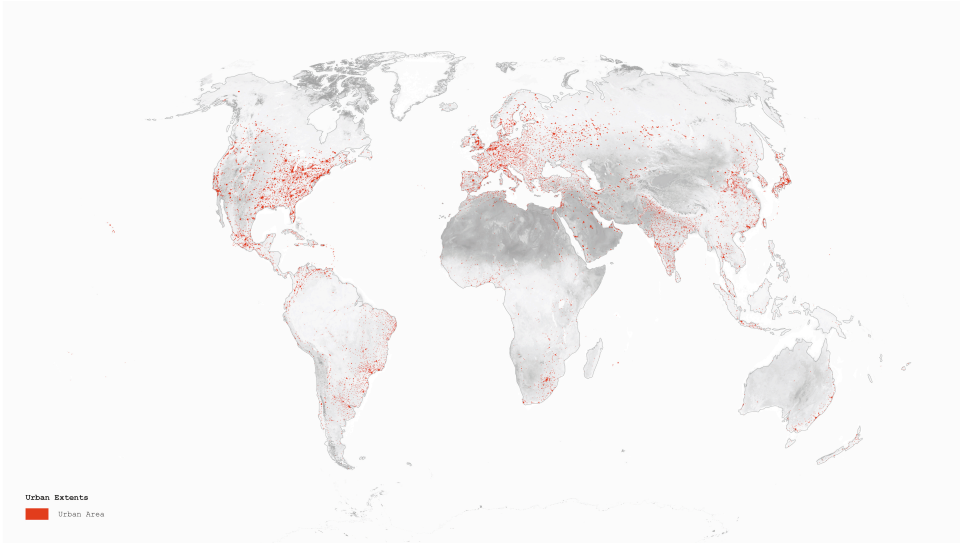
In the past, there were strong boundaries between the city and its surrounding territory, the so-called hinterland. The separation between the city, the villages and the countryside was clear, and so was the hierarchy between them. This situation has changed drastically with the ubiquitous distribution of information technology, particularly the mobile phone and its associated services. The possibility to work at home or from home has changed the life of Swiss citizens, as well as Indian or Brazilian citizens. As the boundaries of the city disappear, urbanized systems, high-density settlements and new forms of habitat - Information Cities - are emerging rapidly throughout the world. Identify and prepare the following:

- Identify and describe two attractive non-urban, non-city settlements which nevertheless show characteristics of an urban settlement
- Identify and describe the most important stocks and flows entering, staying in, and eventually leaving this area
- Describe two approaches how buildings in urban sprawl areas could be transformed from a perceived liability into an asset for the resilience of future cities

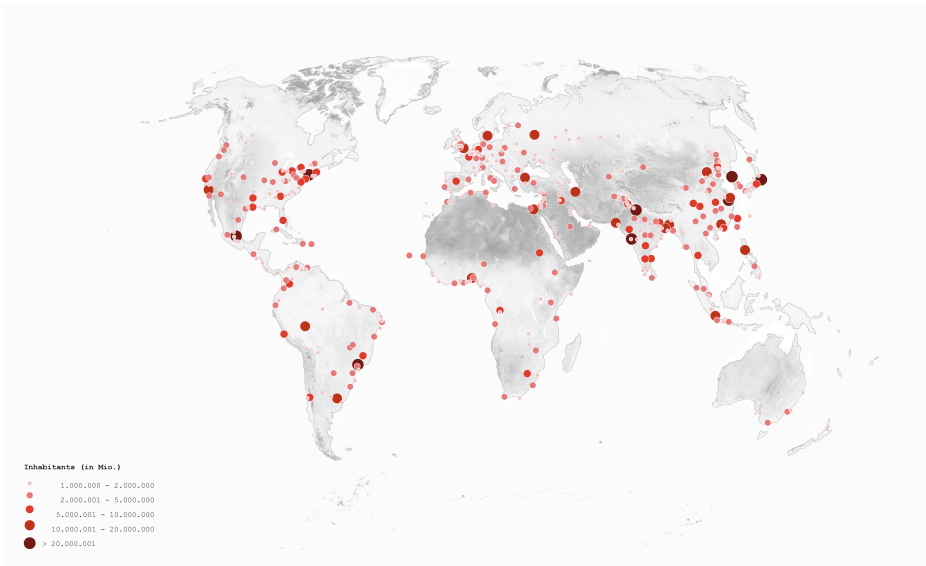
Hand in until December 1, 2014 to shin@arch.ethz.ch, with cc to denise.weber@arch.ethz.ch

Module V: Urban Sociology:
Planetary Urbanization in Comparative Perspective

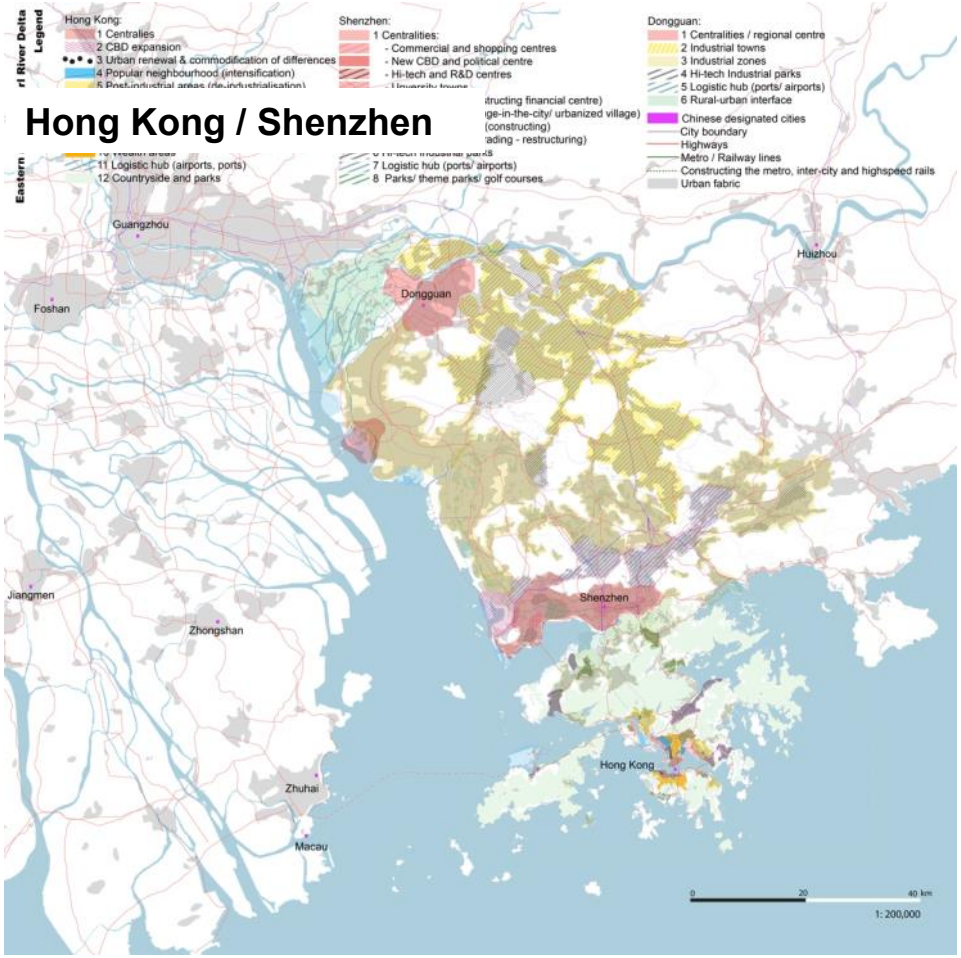
Planetary Urbanization

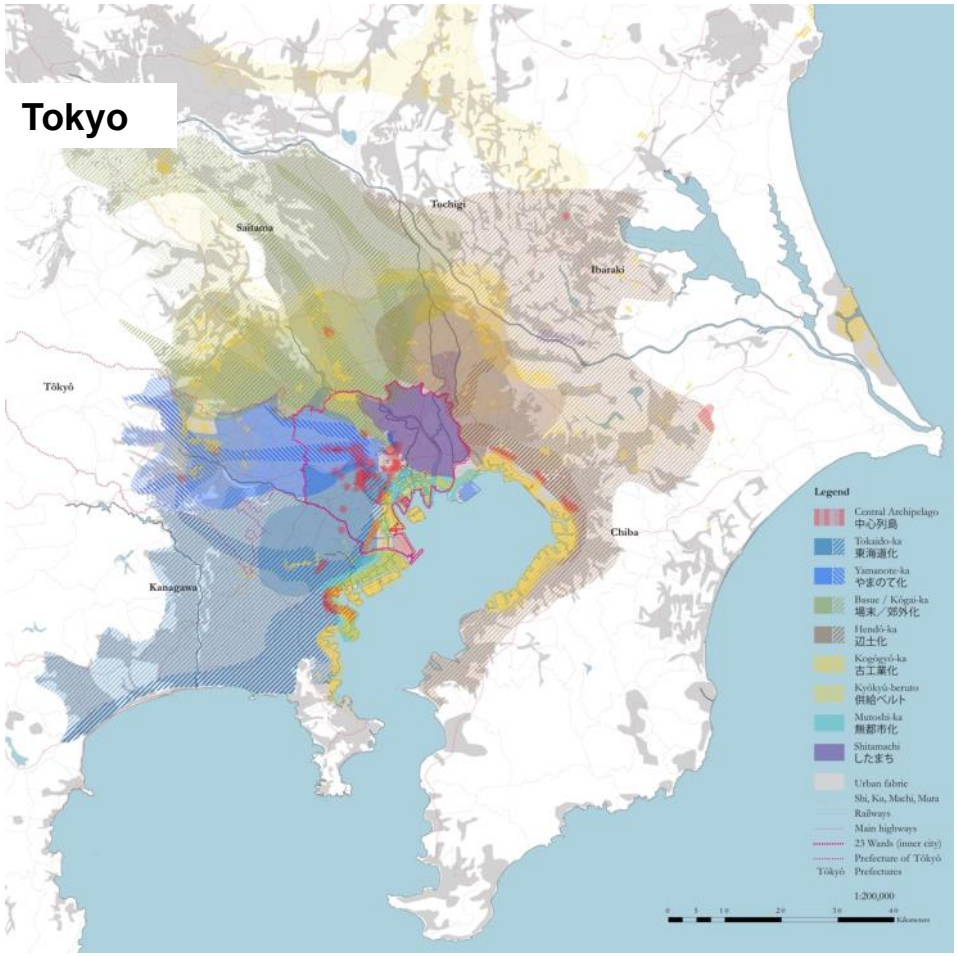


Source: Alpha Data, Columbia University - New York, 2005



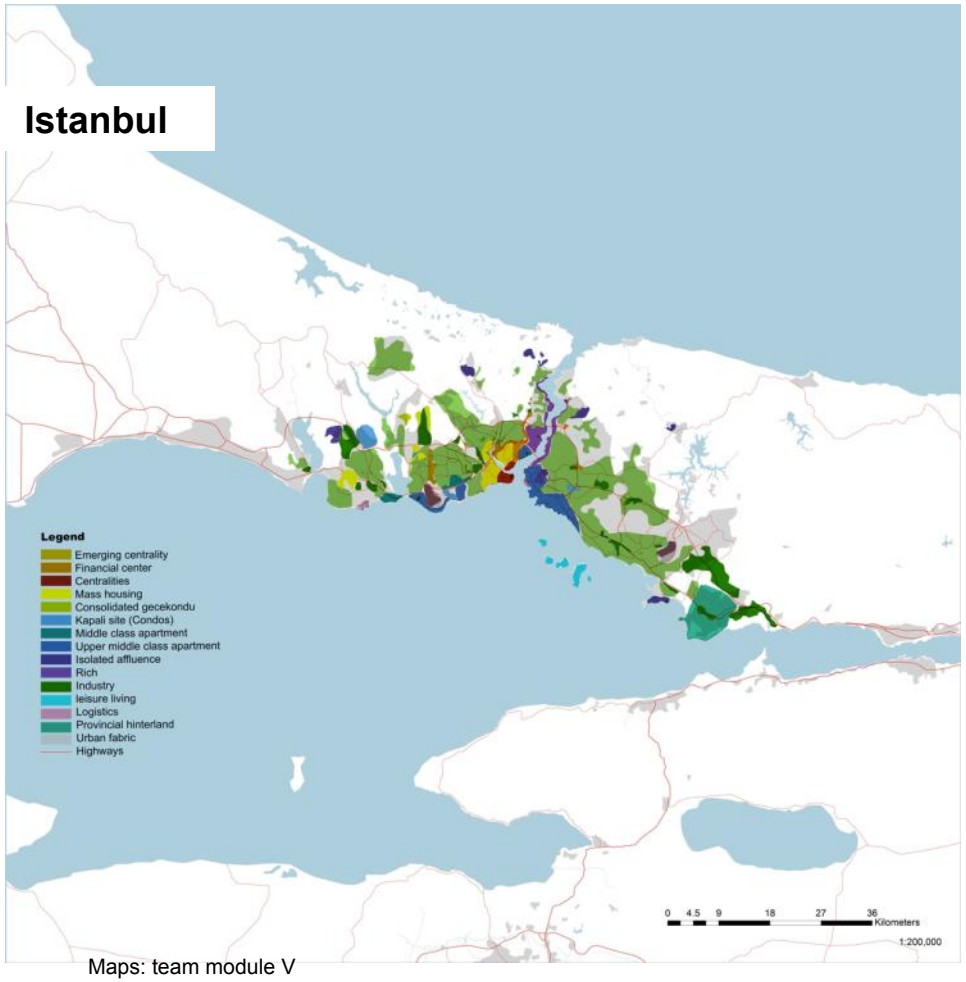
Source: Citypopulation.de, 2008



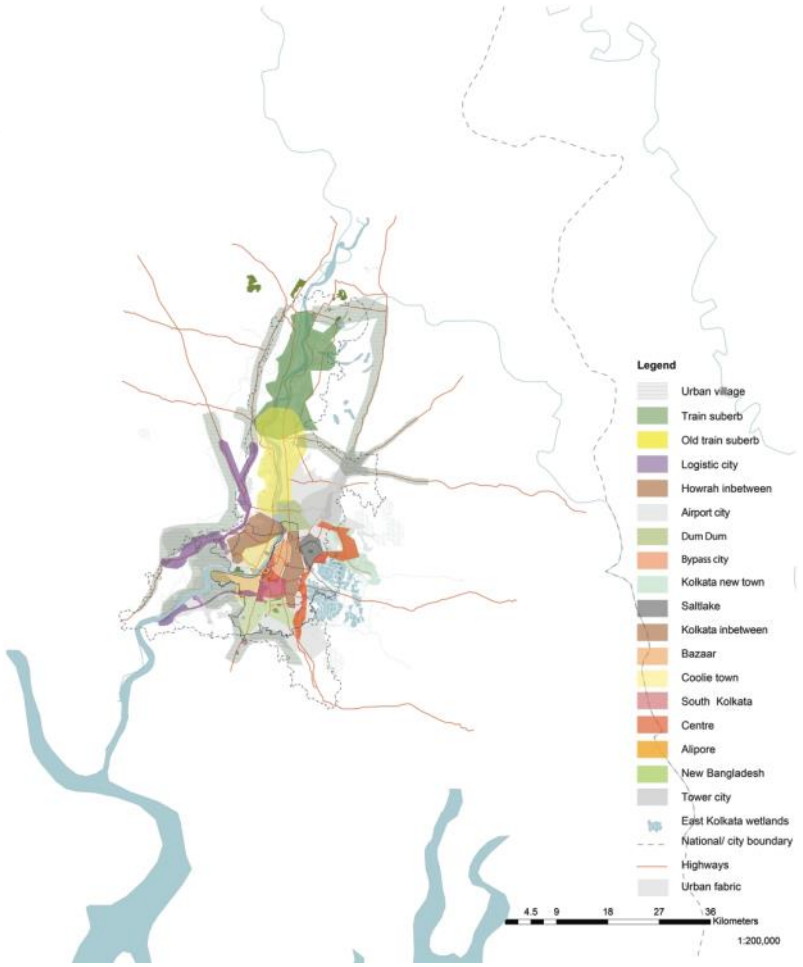


Maps: team module V

Istanbul

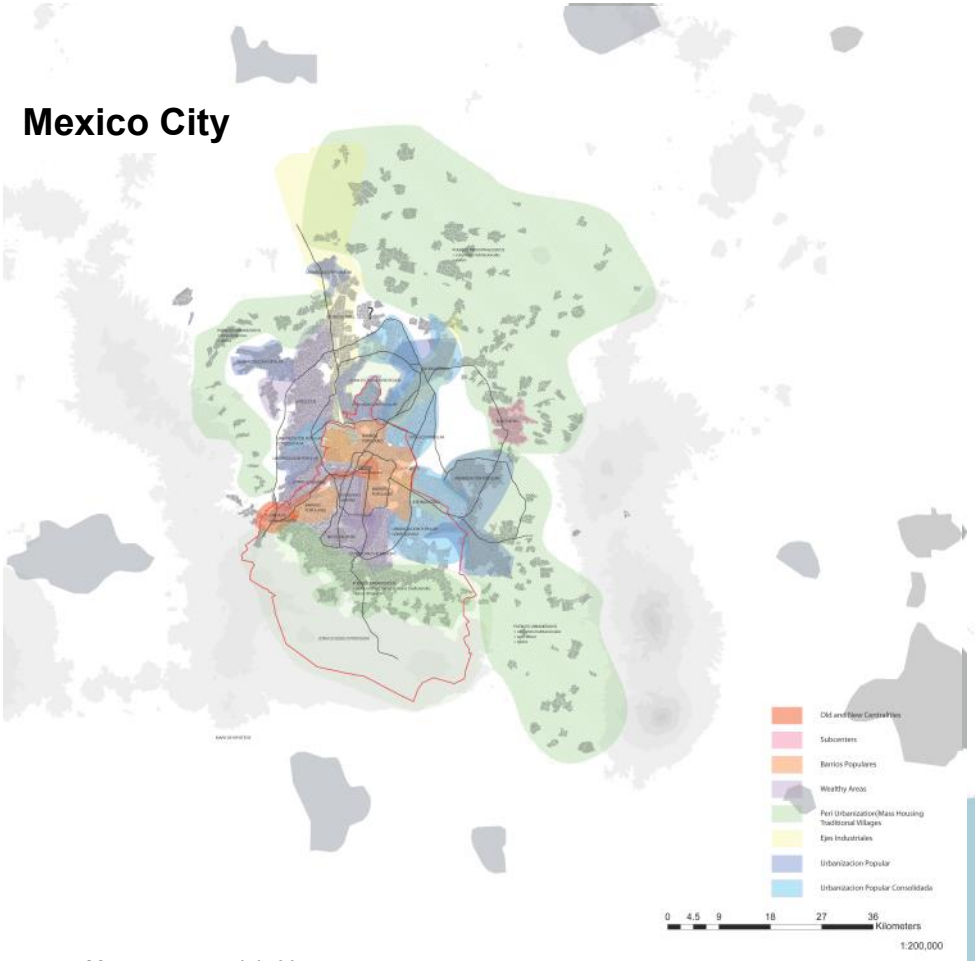


Kolkata

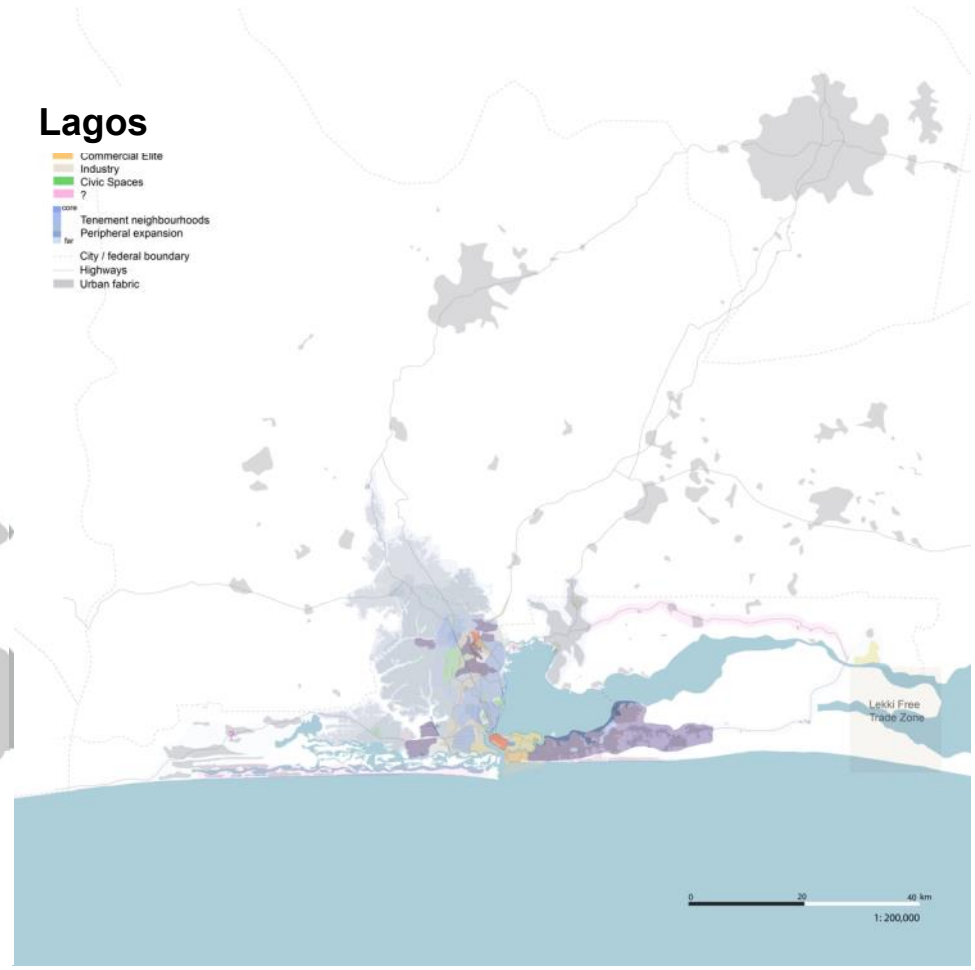


Maps: team module V

Mexico City



Lagos



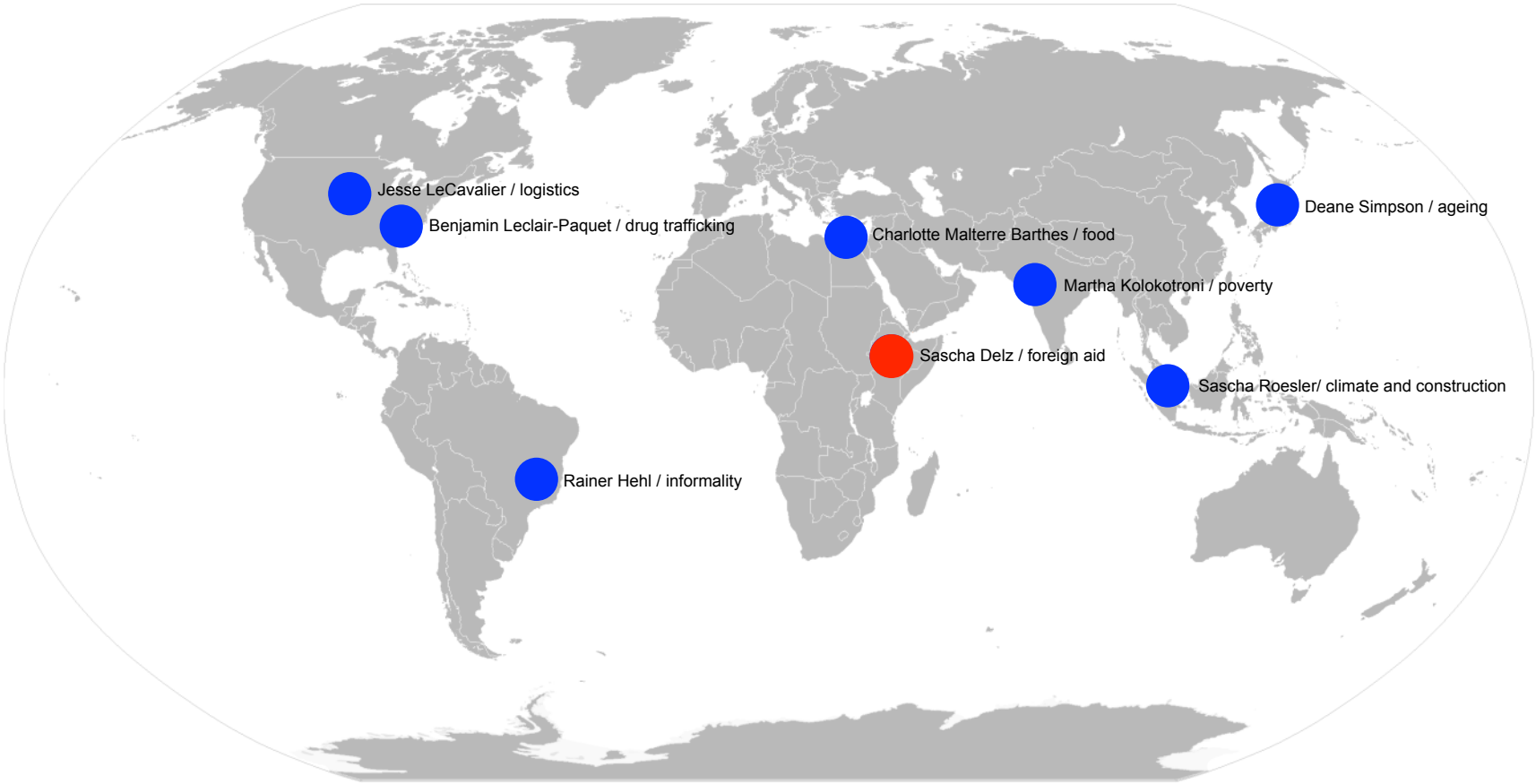
Maps: team module V

Territorial Organisation

Sascha Roesler, Cary Siress, Deane Simpson, Jesse LeCavalier, Rainer Hehl, Benjamin Stähli, Sascha Delz,
Martha Kolokotroni, Benjamin Leclair-Paquet, Charlotte Malterre Barthes, Ani Vihervaara

political economy of territory

ageing
logistics
informality
foreign aid
poverty
drug trafficking
food
climate


Jesse LeCavalier / logistics
Benjamin Leclair-Paquet / drug trafficking
Charlotte Malterre Barthes / food
Deane Simpson / ageing
Martha Kolokotroni / poverty
Sascha Delz / foreign aid
Sascha Roesler/ climate and construction
Rainer Hehl / informality


Bahir Dar
Addis Ababa

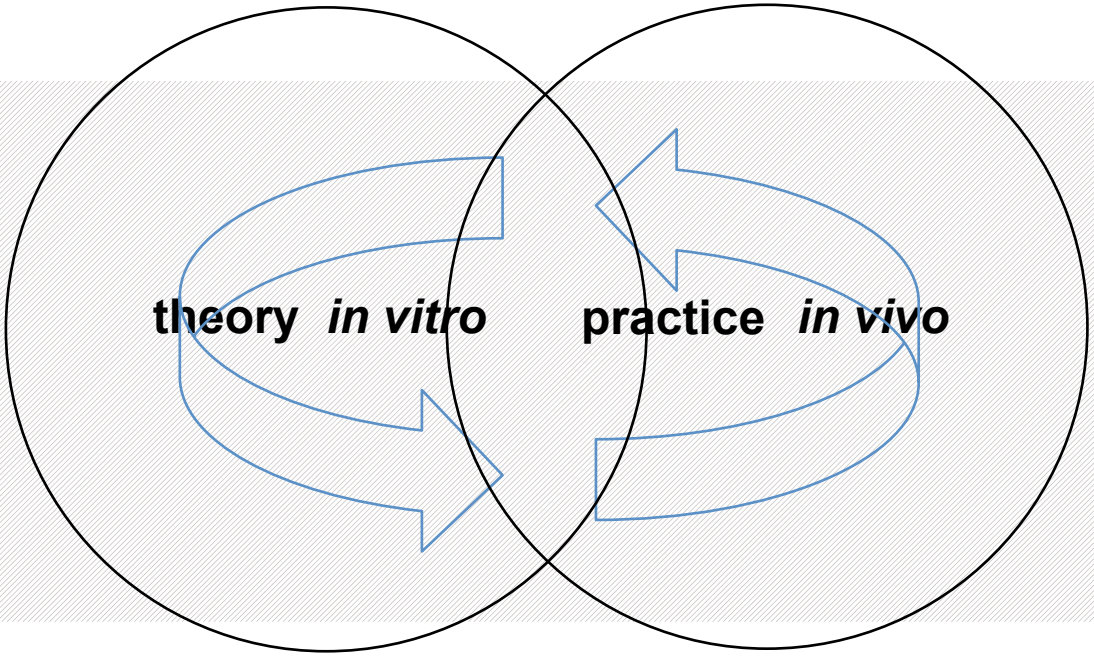

1336000
1335000
1334000
1333000
1332000

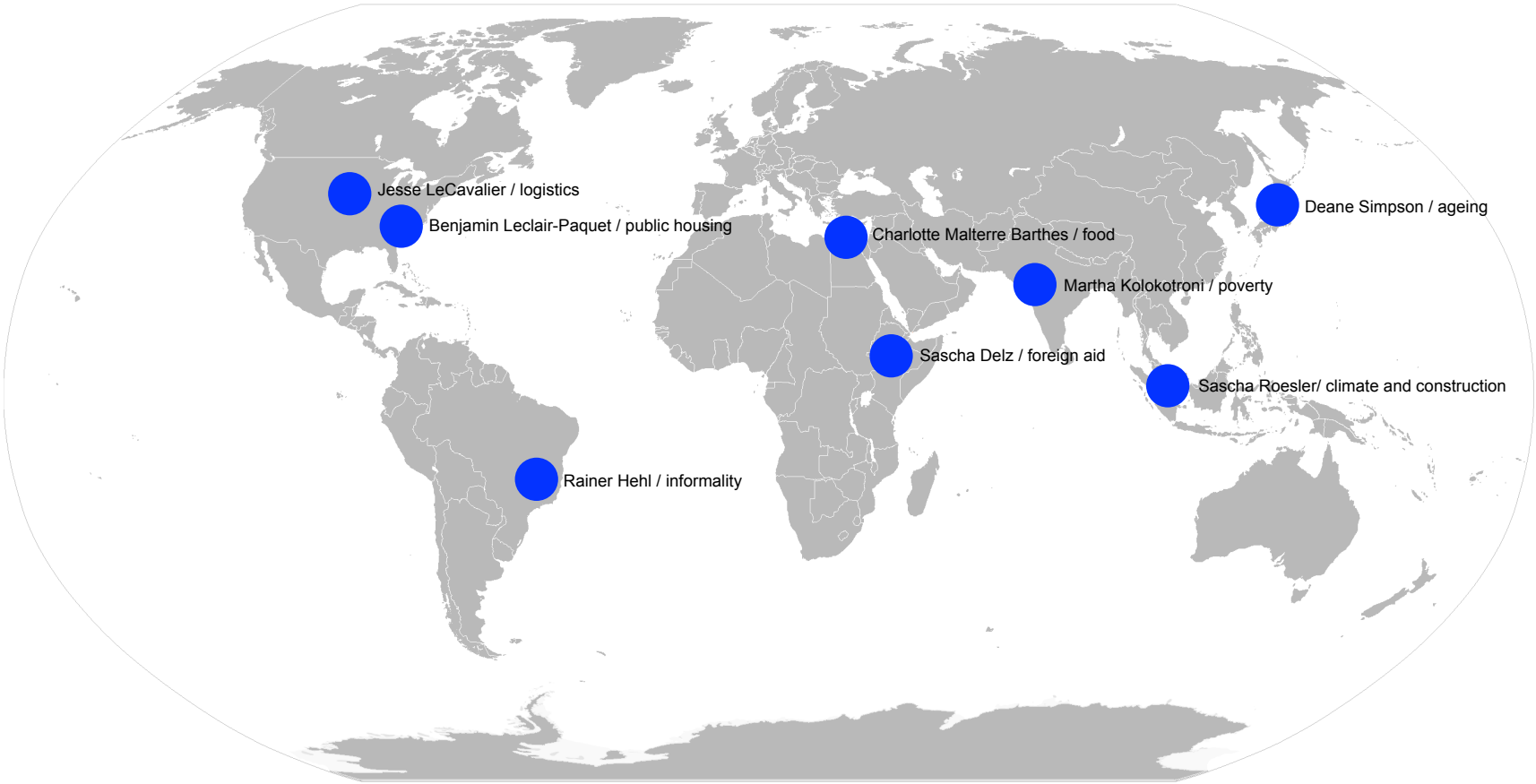

NESTOWN

Territorial Organisation

Marc Angélil, Franz Oswald, Sascha Roesler, Cary Siress, Deane Simpson, Jesse LeCavalier, Rainer Hehl, Benjamin Stähli, Sascha Delz, Marcel Jäggi, Martha Kolokotroni, Benjamin Leclair-Paquet, Charlotte Malterre Barthes, Ani Vihervaara

Module VI investigates the mechanisms at work in the production of territory … and addresses the impact of forms of collective organisation on the make-up of urban environments.

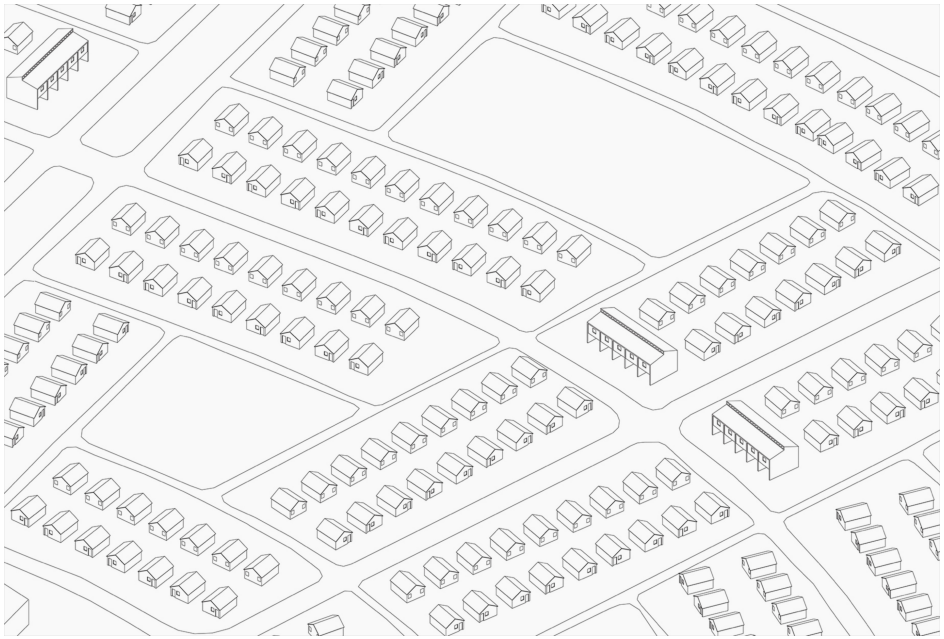

theory in vitro
practice in vivo


Jesse LeCavalier / logistics
Benjamin Leclair-Paquet / public housing
Charlotte Malterre Barthes / food
Deane Simpson / ageing
Martha Kolokotroni / poverty
Sascha Delz / foreign aid
Sascha Roesler/ climate and construction
Rainer Hehl / informality

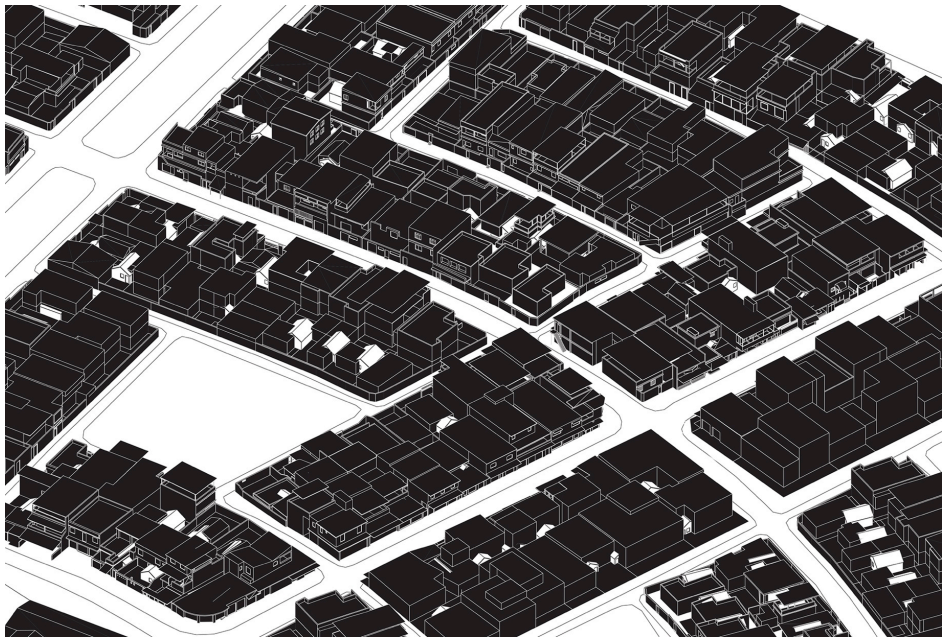
City of God, Fernando Meirelles and Kátia Lund, 2002


RIO


LOTE
13



Cidade de Deus, 1966



Cidade de Deus, 2012

APB AND THE POWER OF THE POPULAR

Rainer Hehl | Something Fantastic

A report from Rio de Janeiro, June 20th 2013

Nobody expected anything as radical would happen on that day. According to official media 1.2 million people were filling the streets raising their voices for more democracy and participation. A wide range of the Brazilian society, young people, popular movements, and enraged citizens were demonstrating against the operating mode of an established system that doesn't take enough care of the people's needs. Brazil has never seen a similar mobilization of protestors claiming for public interests in its whole history. What was the motivation for the uprising of the masses and the sudden explosion of a huge amount of collective energy? Whether the protesters claimed for thorough action against state corruption or for more investment in education, social security and public transportation, one message was clear: from now on things have to change.

The Brazilians were living a similar moment 45 years ago when 100,000 people were occupying public spaces, fighting against state oppression during the military dictatorship, and singing in the streets that "tomorrow has to be another day" (*amanhã há de ser outro dia*). The song line was written by the Brazilian singer-songwriter Chico Buarque who contributed together with artists like Gilberto Gil, Caetano Veloso, and others to the formation of a new music genre MPB—Música Popular Brasileira. Some of the MPB artists led an ephemeral, but high impact movement known as Tropicália that appropriated local and foreign music styles and relativized prevailing notions of authenticity in Brazilian music. The movement radically altered the field of popular music, creating new conditions for the emergence of eclectic and hybridized experiments, but it also defined an inaugural moment for a broad range of artistic practices and behavioral styles identified as "countercultural" during the period of military rule.

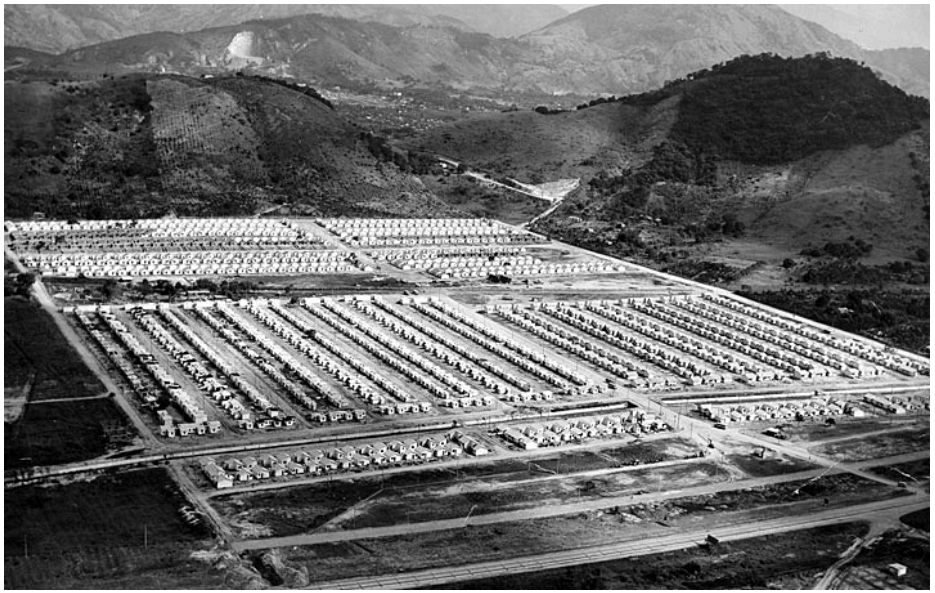
What do the recent uprisings in Brazil have in common with the protests against the oppressive regime? For what kind of change is it standing for? The moment when the recent movement occurred Gilberto Gil, the former minister of culture and one of the most prominent figures of the Tropicalist movement was drawing parallels between what happened back then and now, asking if the popular movements that are occupying the streets today are strong enough to change the reality. Concerned about the monstrous dimension of the riots, but at the same time relieved to see this popular insurgency happening again, he saw a common denominator between the countercultural movement of the past and the kind of mix between rave and raiz (rave-arraste) that we experience today. What is more, according to his interpretation the protests are revealing a phenomenon that applies to the recent global condition dominated by a neoliberal economic system: the ongoing reproduction of asymmetries between the ruling classes and the popular masses—the increasing gap between rich and poor, high and low culture, between top-down governance and bottom-up mobilization.

It might be a pure coincidence that another event happened on June 20th in Rio de Janeiro at Praça Tiradentes in immediate proximity to the revolting masses. Under the supervision of Rainer Hehl, Elena Schütz, Julian Schubert, and Leo Streich a group of ETH students from the MAS Urban Design Program of Prof. Marc Angélil's Chair presented their research on "Popular Brazilian Architecture" to a local crowd. With the eye of an outsider to the investigated culture, building elements, street activities, construction methods, floor plans, public furniture, and other components were collected that seemed to make a fundamental contribution to the richness, vitality, and creativity of Brazilian spaces. The APB (Arquitetura Popular Brasileira) collection was elaborated as "generative grammar," which opposes abstract formal design methods, favoring empirically acquired knowledge upon observation and experimentation, promoting a radical belief to a timeless way of building, grounded on centuries of trials. With a deep interest in the modalities of everyday practice the APB presentation promoted tools that can be applied for the production of urban autonomous providing all qualities needed to enable Brazilian popular cultures and to reinvent them in the same time.

While the peaceful demonstrations turned more and more into riots with violent confrontations between protestors and police, the APB research was arriving at a moment in a Brazil that was emotionally loaded and at the same time open for a new debate. Did the collection of items assembled in the APB catalogue address similar, popular, issues that were at stake in the context of the demonstrations?

The more we experience popular uprisings, whether it be in Brazil, Turkey or in the crisis-shaken European states, the more we realize that the street still remains an important place for the negotiation and articulation of collective interests. Coincidental or not, the APB presentation and the mass demonstrations that happened at the same time in Rio have in common that they are both based on the ingenuity and creativity that is produced within the streetscape. Similar to the claim for more participation as articulated by the protestors, the APB catalogue introduced (again) a new perspective on design practices for and by the people. Against the notion of individual authorship, the collection of "Popular Brazilian Architecture" launched the formation of a repertoire necessary to create popular neighborhoods. By promoting popular cultures the aim of the inventory is to break "common" ground for collective activities and architectural elements that are forming the basis for the project of the city.

The APB research entered the public debate in Brazil at the moment when the relationship between social and political relations were renegotiated, which also offers the opportunity to reformulate the role of urban design within the public realm. If half a century ago the Tropicalista movement transformed the traditional notion of Brazilian popular music into an open process of creative production, an investigation of popular architecture could have a similar impact in the context of the social transformations that are happening today. Whether we look at the experimentation of collective action in the streets of Rio or at the emerging interests in APB=Arquitetura Popular Brasileira, June 20th marked the beginning of a new understanding of popular movements in Brazil, but it also offered the opportunity to rethink design practice as a powerful tool for the reproduction and reinvention of popular architecture and culture as a whole.



Vila Kennedy, Rio de Janeiro, early 1960s

Minha Casa Minha Vida, 800 units in Buena Vista, 2012

Design guidelines, Minha Casa Nossa Cidade, 2013

Studio-X Rio de Janeiro, June 2013

Demonstration Rio de Janeiro, June 2013

Inês Magalhães, National Housing Secretary and head of the MCMV programme, Ministry of the Cities, Brasília

Minha Casa Minha Vida Programme

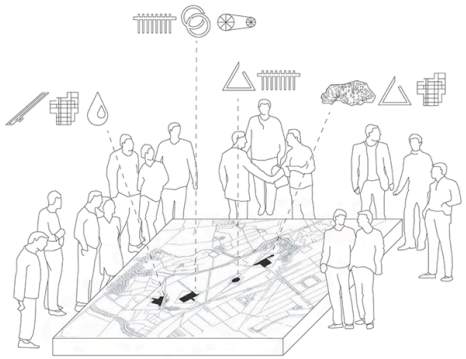

Roraima
Amapa
Manaus
Pará
Parauapebas
Brazil
Maranhão
Ceará
Rio Grande do Norte
Natal
João Pessoa
Paraíba
Piauí
Pernambuco
Recife
Alagoas
Maceió
Sergipe
Tocantins
Bahia
Salvador
Mato Grosso
Rondônia
Cuiabá
State of Goiás
Goiânia
Brasília
Fortaleza
São Luís
Belém
Teresina


NOSSA TERRA

SELO DE QUALIDADE URBANA
CRITÉRIOS DE QUALIDADE

DIRETRIZ 1

DIAGNÓSTICO E PLANO URBANÍSTICO



Criar modelos urbanos mais agradáveis, harmoniosos e sustentáveis em nome da qualidade urbana para as futuras gerações.

OBJETIVOS A SEREM ALCANÇADOS

COLETIVIDADE
DIVERSIDADE
FLEXIBILIDADE
SUSTENTABILIDADE
QUALIDADE ARQUITETÔNICA

A INTEGRANDO O MEIO AMBIENTE NATURAL AO URBANO:
- Identificar e preservar elementos naturais do sítio, como: morros, pântanos e florestas.
- Estabelecer espaços e corredores verdes criando uma rede que integra o meio natural e o urbano.
- Projetar espaços destinados a parques ou paisagens produtivas, como: agricultura, cultivo de mudas, áreas de reflorestamento etc; anexando aos elementos naturais como ambiente de transição da paisagem.

B CONECTANDO À MALHA PREEXISTENTE:
- Traçar a nova rede de infra-estrutura urbana, criando uma rede urbana aberta bem como conectando o novo empreendimento às areas vizinhas na escala territorial.
- Definir as novas funções dessas vias conforme à malha preexistente.
- Prever uma malha urbana que apresenta gabaritos diferenciados, atendendo às necessidades da hierarquia viária.

C CICLOVIAS
- Definir as ciclovias conforme projetos municipais de mobilidade urbana existentes ou a serem implantados.

D INFRASTRUTURA
- Apresentar, as informações oficiais (da Prefeitura e instâncias colegiadas correlatas e/ou da concessionária) sobre o que existe de infraestrutura de saneamento e de prestação dos serviços públicos de saneamento básico na área em que se insere o empreendimento, com relação a abastecimento de água e Esgotamento Sanitário, manejo de Resíduos Sólidos e drenagem urbana, manejo de resíduos sólidos e drenagem urbana.
- Apresentar o estudo de viabilidade com as alternativas de integração do empreendimento aos serviços públicos de saneamento tanto do ponto de vista da integração física da infraestrutura, quanto das medidas necessárias para a integração operacional do empreendimento à prestação regular destes serviços na cidade. (abastecimento de água, esgotamento sanitário, manejo de resíduos sólidos e limpeza urbana, drenagem e manejo de águas pluviais urbanas)

CRITÉRIOS:

5.1 Projetar diferentes tipos de praças em função da inserção urbana, do diagnóstico urbano e da área total do emprendimento. Usar como parâmetro área equivalente a 4,5m² de praça por habitante, a ser usado para a implantação de 3 tipos de escalas de praças: (1) Cívica, (2) Local e (3) Privada ou semi-pública. VER➡ B C D

5.2 Com relação as vias de circulação, a praça deverá apresentar no máximo duas vias adjacentes ao seu perímetro.

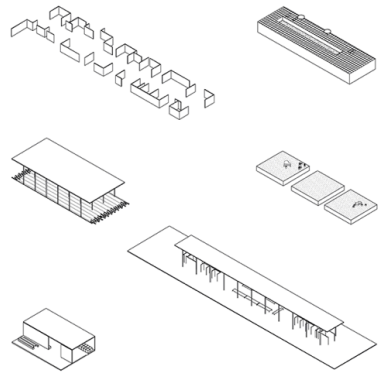
5.3 Projetar obrigatoriamente o acesso das edificações - habitação e comércio - diretamente à praça, evitando muros no seu perímetro e trazendo segurança a este espaço público.

5.4 Prever nas praças cívicas o PROJETO PAISAGÍSTICO e PROJETO ARQUITETÔNICO para edificação ou espaço coberto de uso coletivo e espaço para atividades de recreação e lazer.

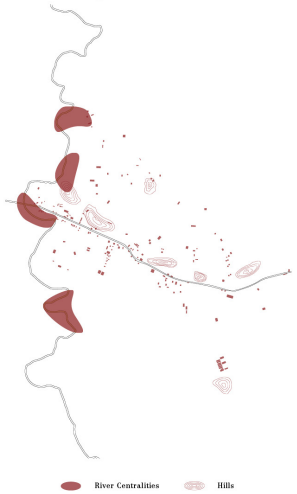
5.5 Agendar dois encontros com a presença do ARQUITETO E DO PAISAGISTA junto a comunidade. O primeiro encontro visa a definição do programa das praças (quanto a equipamentos e infraestrutura de lazer) conforme a demanda dos moradores e aquelas já identificadas no diagnóstico urbano. O segundo encontro visa a apresentação do MANUAL DO PROJETO arquitetônico e paisagístico , desses espaços públicos para os futuros moradores. Ambos os encontros deveräoser feitos em parceria com o trabalho TECNO SOCIAL gerenciado pelo municipio.* VER➡ A E

PONTUAÇÃO:1000 OBRIGATÓRIO

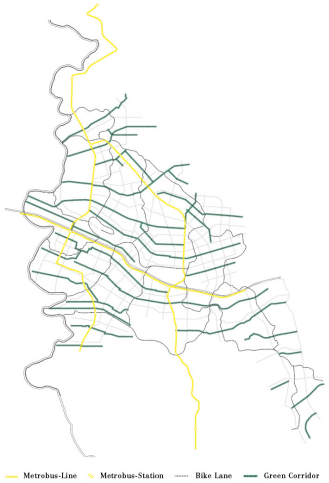
A Prover uma combinação de diferentes tipos de equipamentos e infra-estrutura de lazer, como: marquise, escadaria, área coberta, espaços auto-organizados de múltiplos usos, cozinha coletiva, feiras livres, clubes de xadrez, oficinas de arte, centros comunitários, surgindo como catalisadores de atração social e facilitadores da manutenção dos espaços.



Proposed Centralities

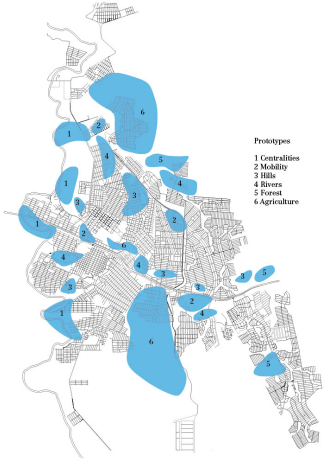


Proposed Mobility

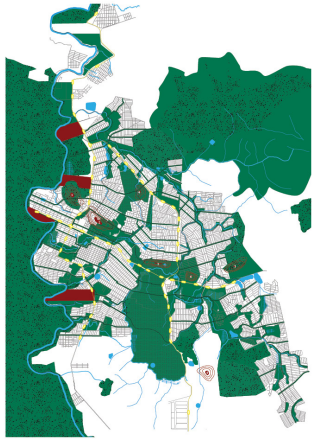


Proposed Vegetation

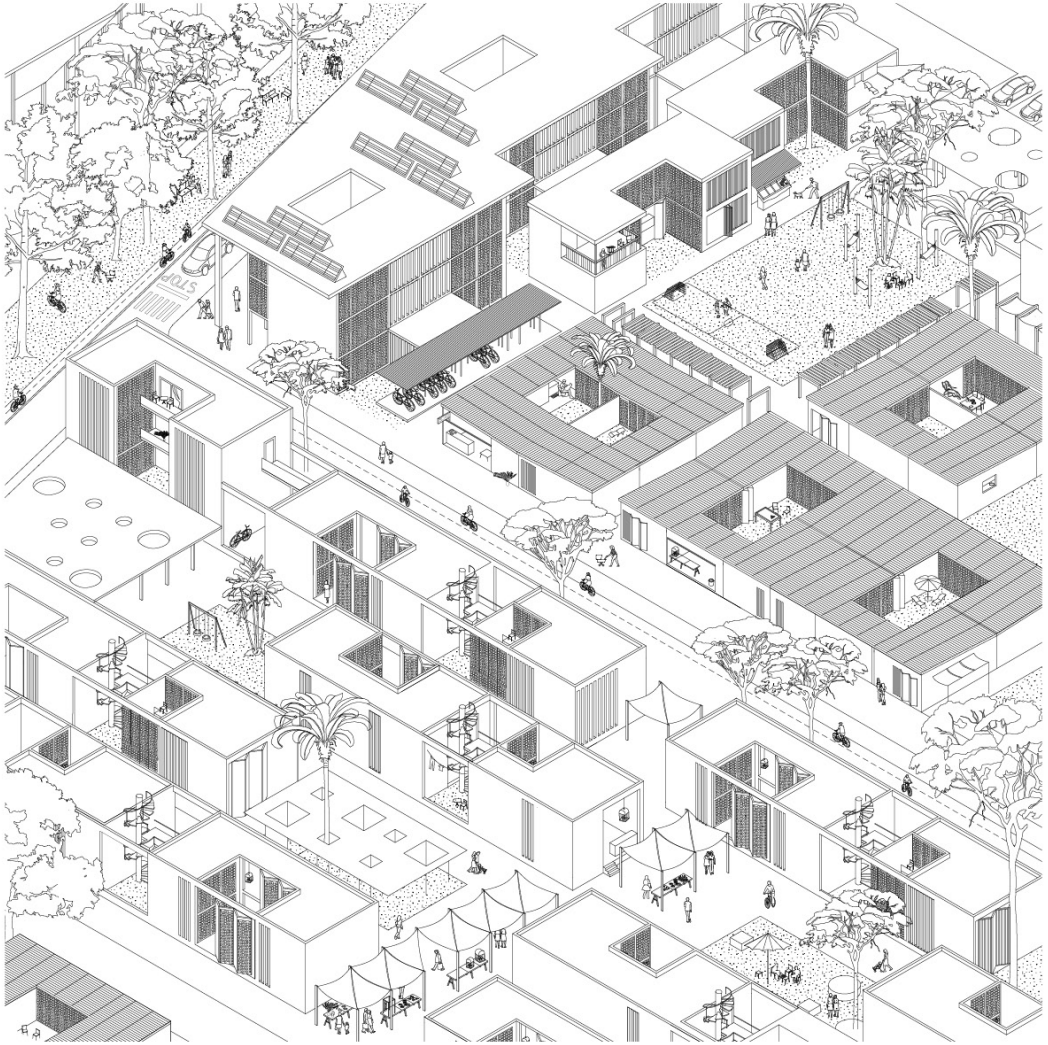
Proposed Housing and Location in the City



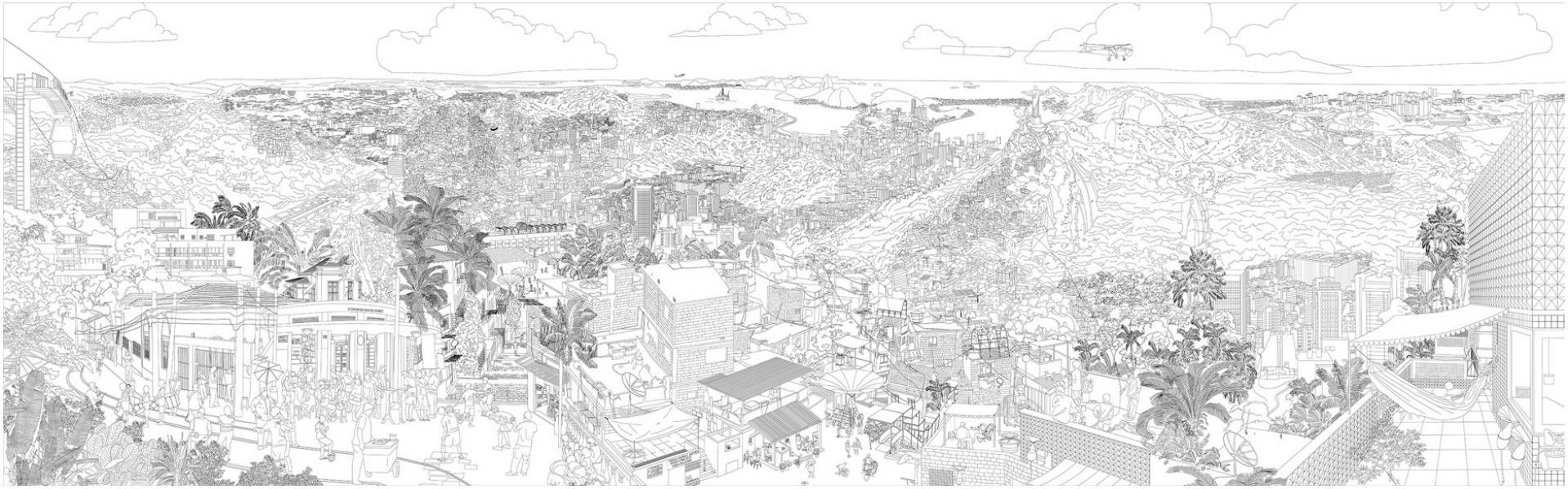
Master Plan: 2015–2024



Masterplan for the Municipality of Parauapebas, August 2014



Neighborhood Parauapebas, August 2014



Uneven Growth: Tactical Urbanisms for Expanding Megacities
Museum of Modern Art New York, November 22, 2014 – May 10, 2015 / Panorama 14m x 3.5 m

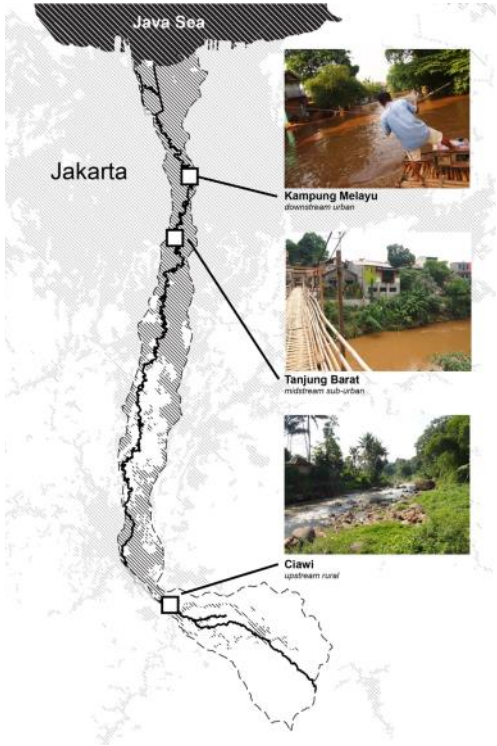
Landscape Ecology

Team | Synergies | Aim | Progress | DRS | Dissemination | Next steps

Aim & Methods

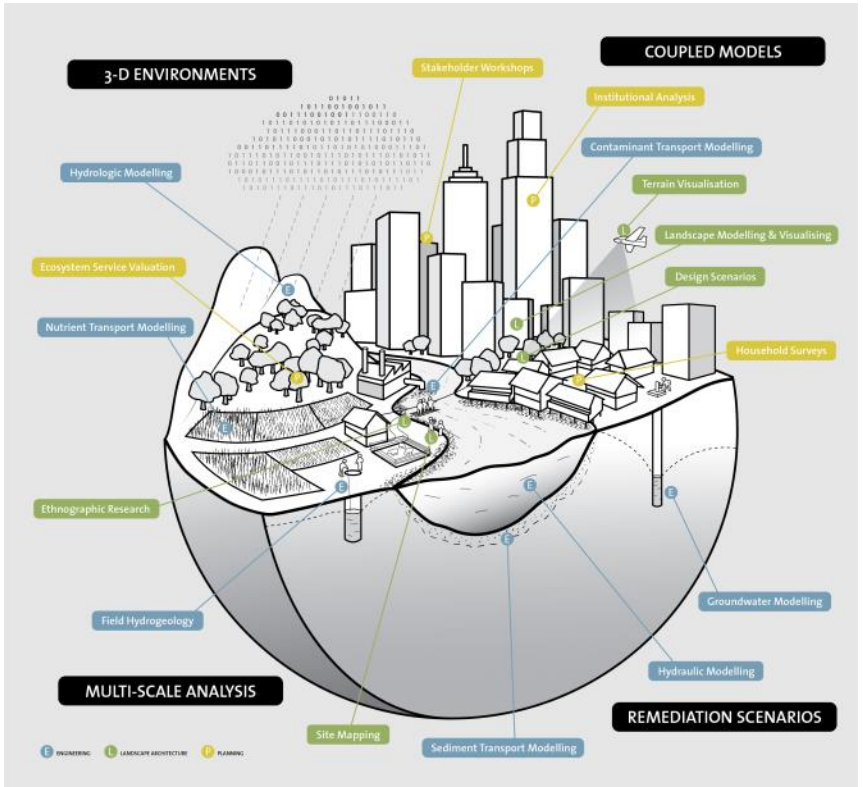
Demonstrating that a change of paradigm in river rehabilitation is possible, and providing a future vision that balances concerns over flooding, water quality, and ecology, with the realities of a rapidly growing Southeast Asian city

Study area



Ciliwung River, Indonesia

Methods



ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Landscape Ecology

Prof. Christophe Girot

(SEC) SINGAPORE-ETH CENTRE 新加坡－ETH 研究中心

(FCL) FUTURE CITIES LABORATORY 未来城市实验室

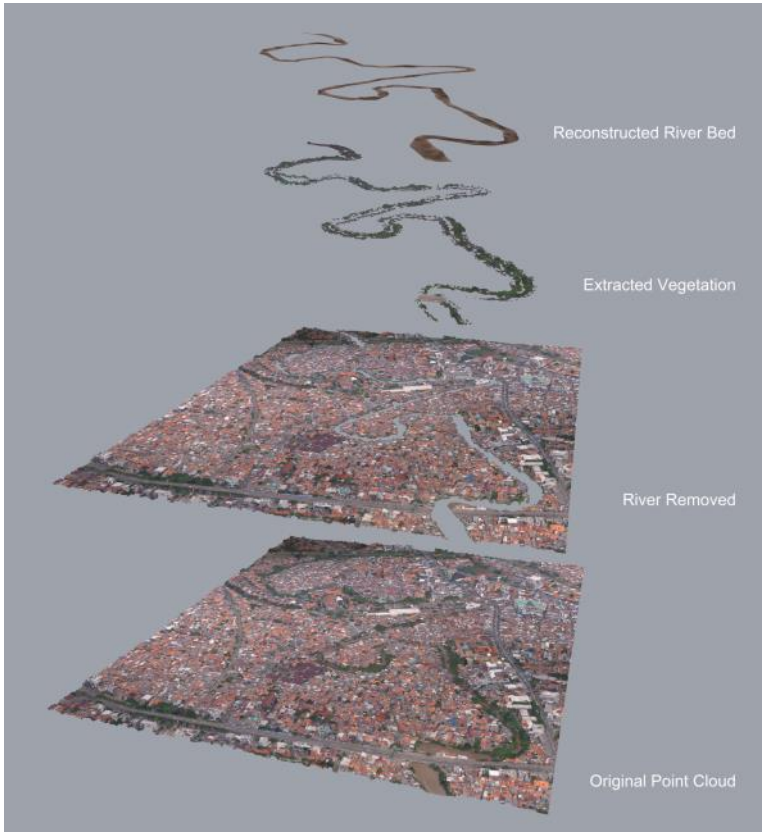
Environmental Modelling and Simulations

Flood simulation in Kampung Melayu

Contaminant simulation

To develop designs and interventions that are grounded in the realities of a megacity, mathematical modelling of flow of water as well as the propagation of pollutants and contaminants can provide valuable insight.

As demonstrated in the videos, the know-how from the disciplines of Landscape Architecture and Environmental Engineering has been integrated to create a platform not only to design and validate, but also to communicate to a larger audience the issues involved.



Modification of 3D Point Cloud Datasets

Changes to River Profile

Large Infrastructural Interventions

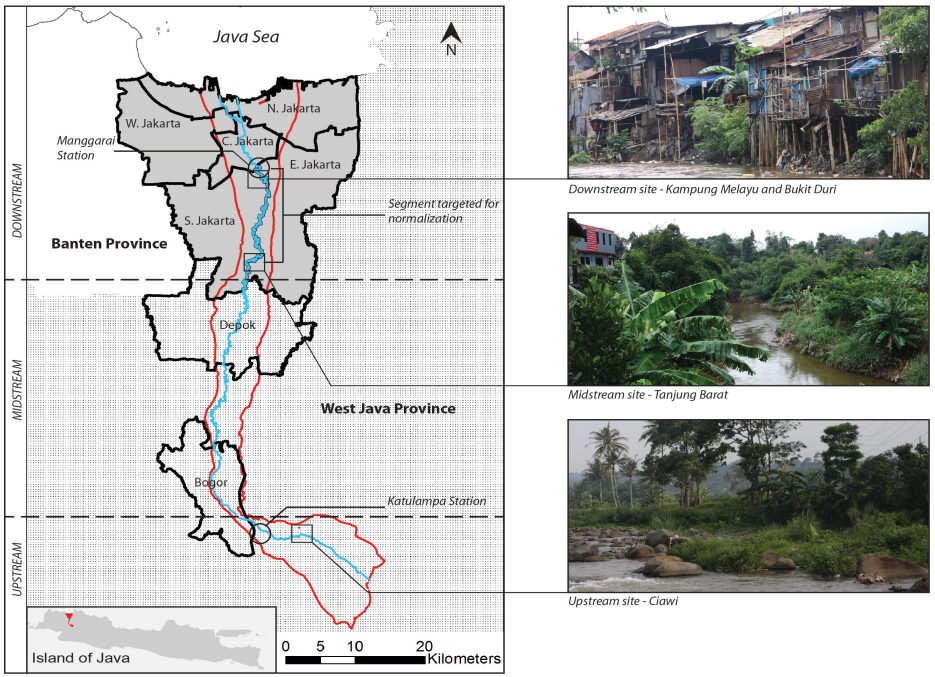
Changes in Land Use

Landscape Ecology

Team | Synergies | Aim | Progress | DRS | Dissemination | Next steps

Aim & Methods

Demonstrating that a change of paradigm in river rehabilitation is possible, and providing a future vision that balances concerns over flooding, water quality, and ecology, with the realities of a rapidly growing Southeast Asian city



Downstream site - Kampung Melayu and Bukit Duri

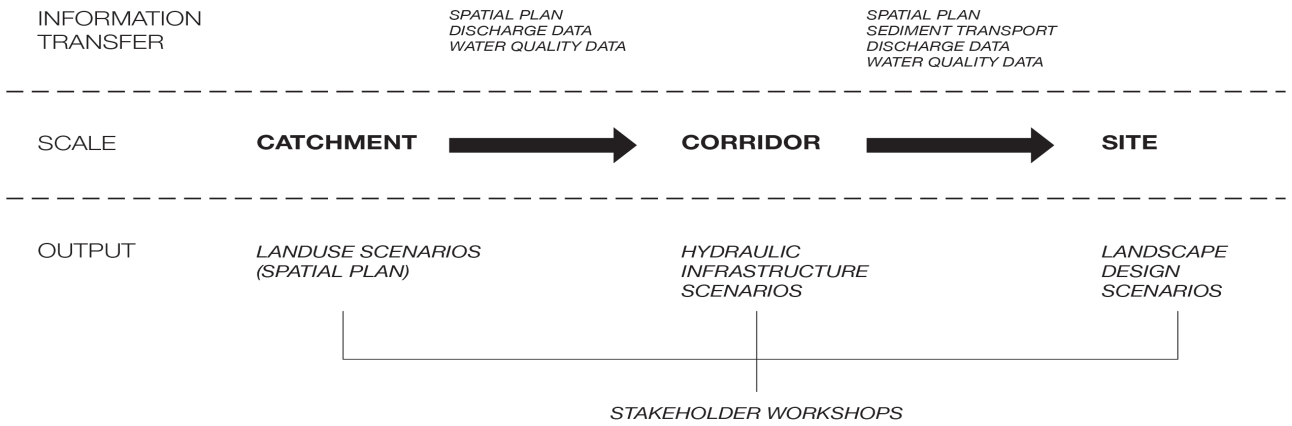
Midstream site - Tanjung Barat

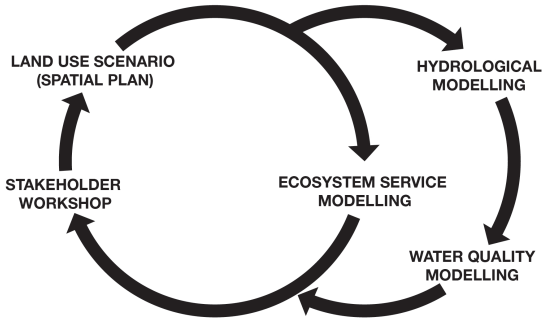
Upstream site - Ciawi

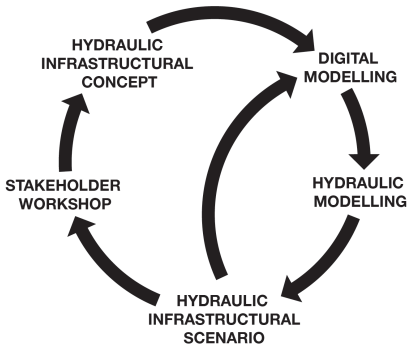
Ciliwung River, Indonesia

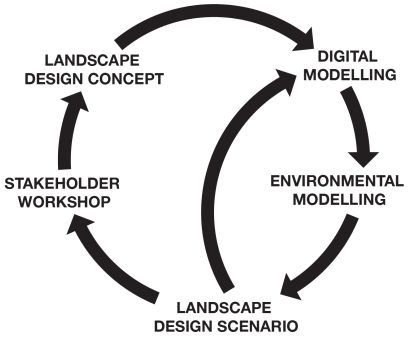
Knowledge integration

- ❑ Using 3-D visual models as a platform to present analytical results and get feedback
- ❑ Coupling sediment transport, groundwater, water quality, and hydrological models to form an integrated suite
- ❑ Incorporating site-scale observations into catchment-scale analysis and vice-versa
- ❑ Developing scenarios for a rehabilitated river corridor


INFORMATION TRANSFER
SPATIAL PLAN
DISCHARGE DATA
WATER QUALITY DATA
SPATIAL PLAN
SEDIMENT TRANSPORT
DISCHARGE DATA
WATER QUALITY DATA
SCALE
CATCHMENT
CORRIDOR
SITE
OUTPUT
LANDUSE SCENARIOS (SPATIAL PLAN)
HYDRAULIC INFRASTRUCTURE SCENARIOS
LANDSCAPE DESIGN SCENARIOS
STAKEHOLDER WORKSHOPS


LAND USE SCENARIO (SPATIAL PLAN)
HYDROLOGICAL MODELLING
ECOSYSTEM SERVICE MODELLING
WATER QUALITY MODELLING
STAKEHOLDER WORKSHOP


HYDRAULIC INFRASTRUCTURAL CONCEPT
DIGITAL MODELLING
HYDRAULIC MODELLING
HYDRAULIC INFRASTRUCTURAL SCENARIO
STAKEHOLDER WORKSHOP

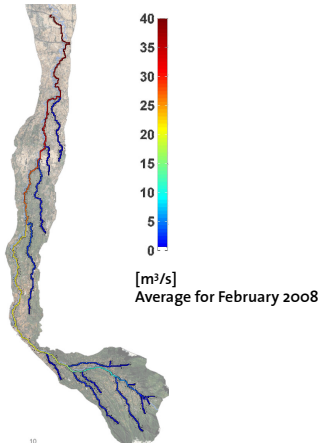

LANDSCAPE DESIGN CONCEPT
DIGITAL MODELLING
ENVIRONMENTAL MODELLING
LANDSCAPE DESIGN SCENARIO
STAKEHOLDER WORKSHOP

Catchment Scale Modelling

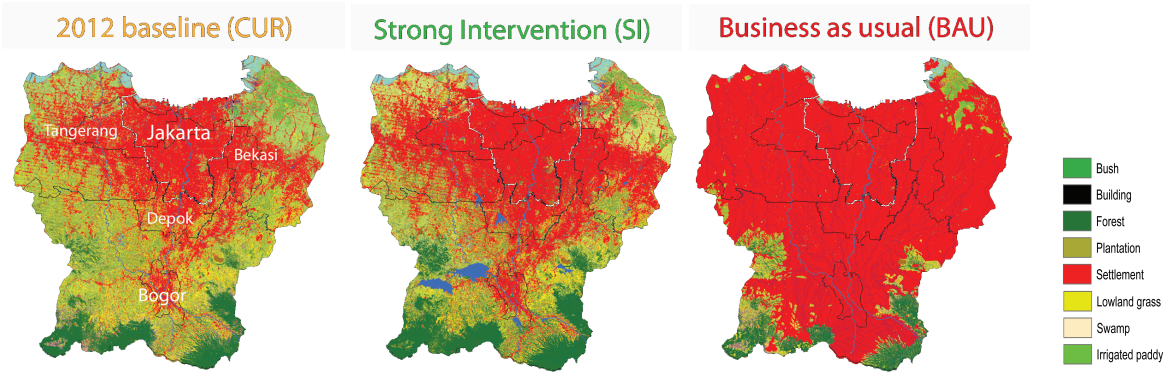
Hydrological model to reproduce water —environment interactions:

- Flood events
- Land use and climate impacts
- Effects of new water infrastructures
- Groundwater recharge, etc.

Hourly water discharge along the river



Future land use scenarios for the entire region (2030)

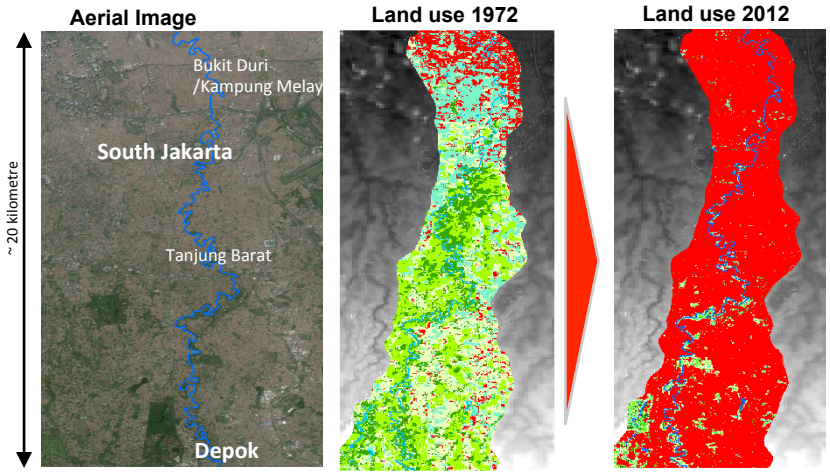


Up to +20% water discharge in Jakarta for a major flood event if urban expansion not controlled

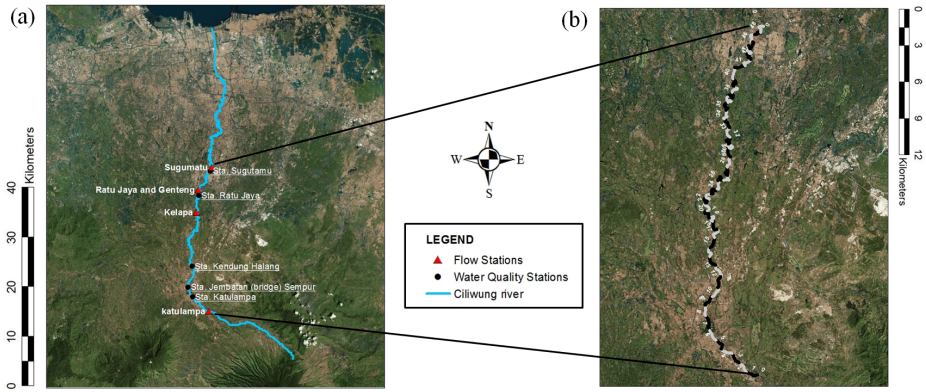
Corridor Scale Modelling

Impact of rapid urbanization along the **River-corridor** on flooding and water availability

- Higher flood peaks during wet season: Propagation of flood wave down the river is faster
- Lower groundwater availability during dry season: Depression in groundwater table due to lower infiltration rates leading to dry wells
- Models developed to help evaluate interventions (like infiltration wells) to manage this dual problem



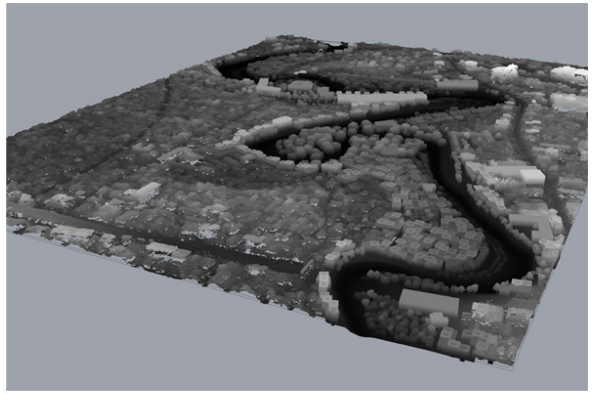
Reverse modelling to estimate pollution loadings



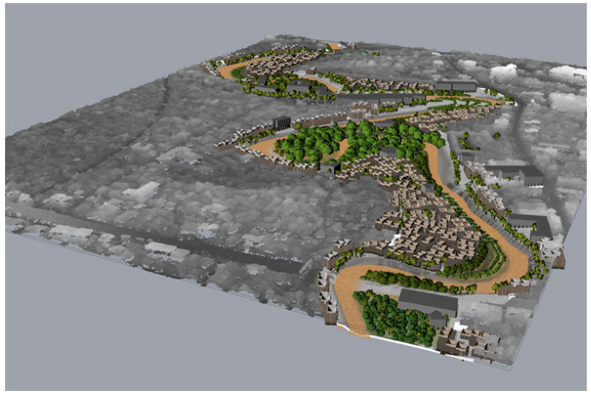
Region modeled and Model grid

Modified Point Cloud Datasets Coupled with Environmental Modelling

Original Point Cloud Model



Large Scale Modifications to the Landscape



Flood Extent Simulation

Flood Velocity Simulation

To develop designs and interventions that are grounded in the realities of a megacity, mathematical modelling of flow of water as well as the propagation of pollutants and contaminants can provide valuable insight.

As demonstrated in the videos, the know-how from the disciplines of Landscape Architecture and Environmental Engineering has been integrated to create a platform not only to design and validate, but also to communicate to a larger audience the issues involved.

Environmental Modelling and Simulations

Flood simulation in Kampung Melayu

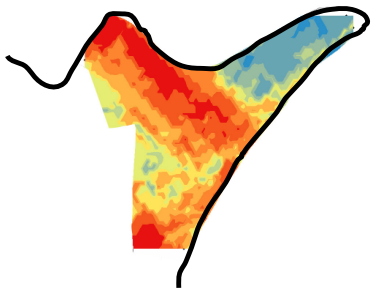
Contaminant simulation

To develop designs and interventions that are grounded in the realities of a megacity, mathematical modelling of flow of water as well as the propagation of pollutants and contaminants can provide valuable insight.

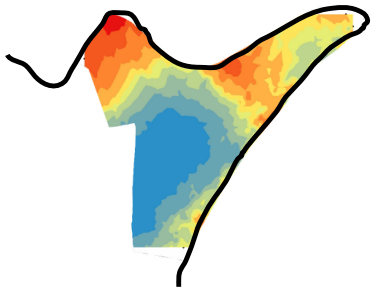
As demonstrated in the videos, the know-how from the disciplines of Landscape Architecture and Environmental Engineering has been integrated to create a platform not only to design and validate, but also to communicate to a larger audience the issues involved.

Design scenarios for urban river landscapes

Terrestrial laser scans of riverbank neighbourhoods



Probability that a household grows plants

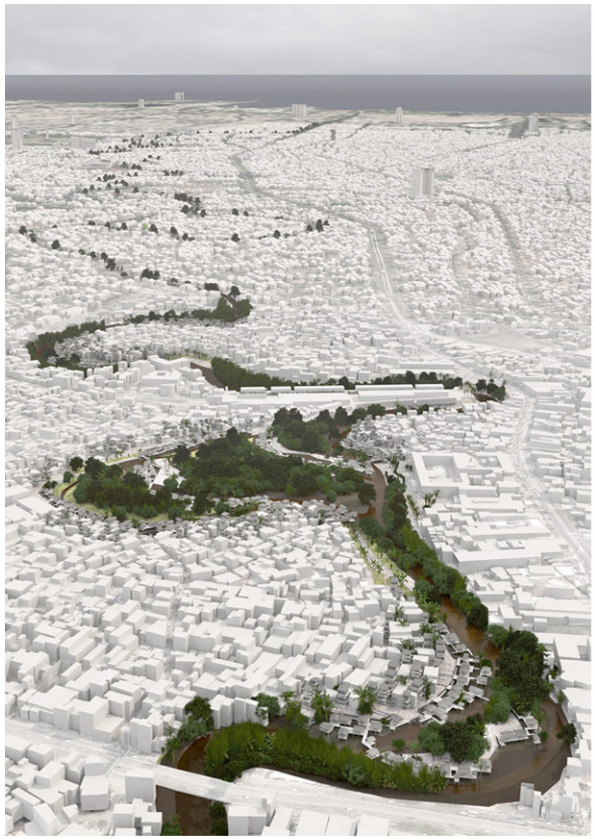


Probability that a household visits the river for recreation

To develop designs and interventions that are socio-culturally, and ecologically grounded within the local environment, detailed spatial, and qualitative data of the urban fabric and river landscape is gathered and reacted upon within future landscape transformations.

Design scenarios are developed for urban river landscapes with ongoing engagement from local communities and NGOs.

Design Research Studio Outputs



ARCHITECTURE OF TERRITORY
HINTERLAND

SINGAPORE'S HINTERLAND | PRODUCTIVE TERRITORIES | RESOURCES | MODEL LAND | SIJORI

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Architecture and Territorial Planning

Asst. Prof. Milica Topalovic

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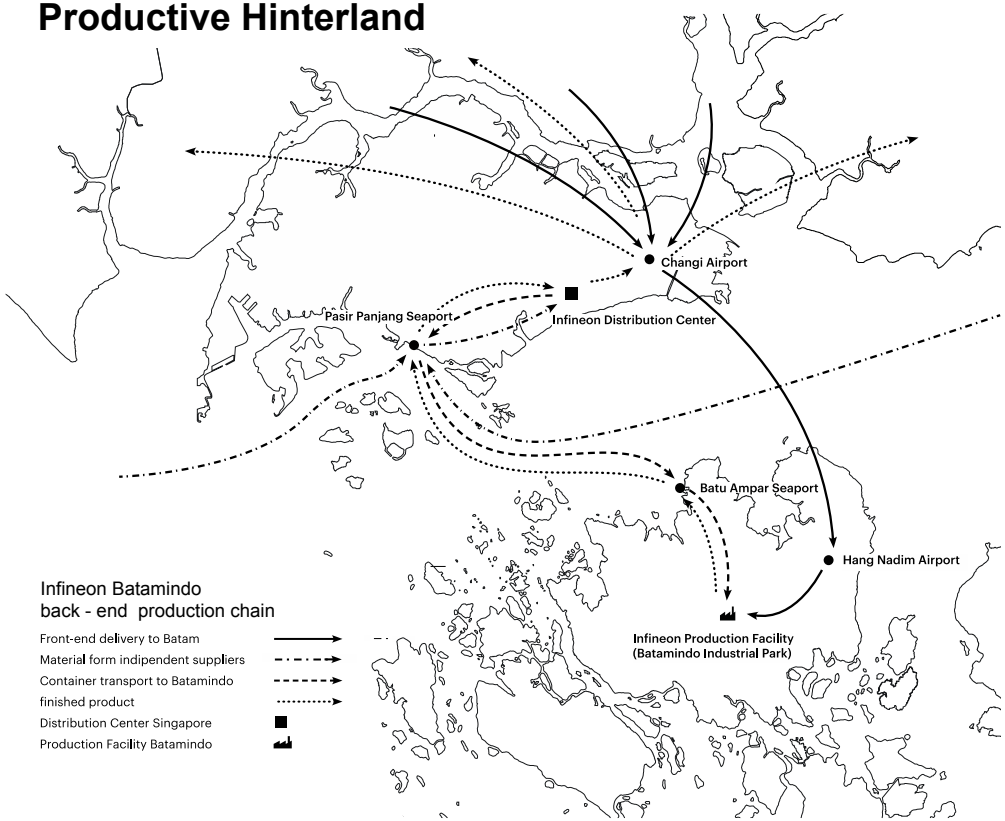
Productive Hinterland



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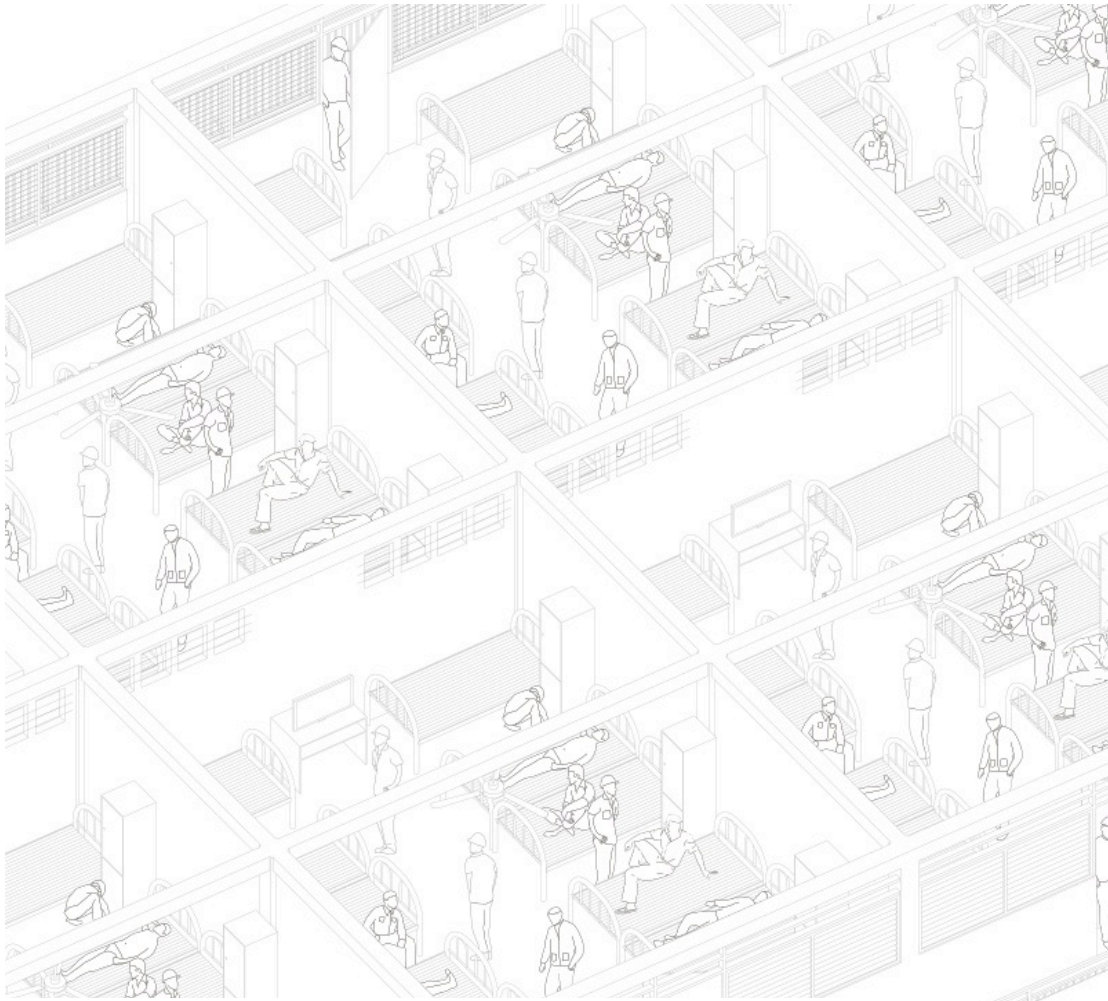
Resource Hinterland

OTC Oversea Training Centers



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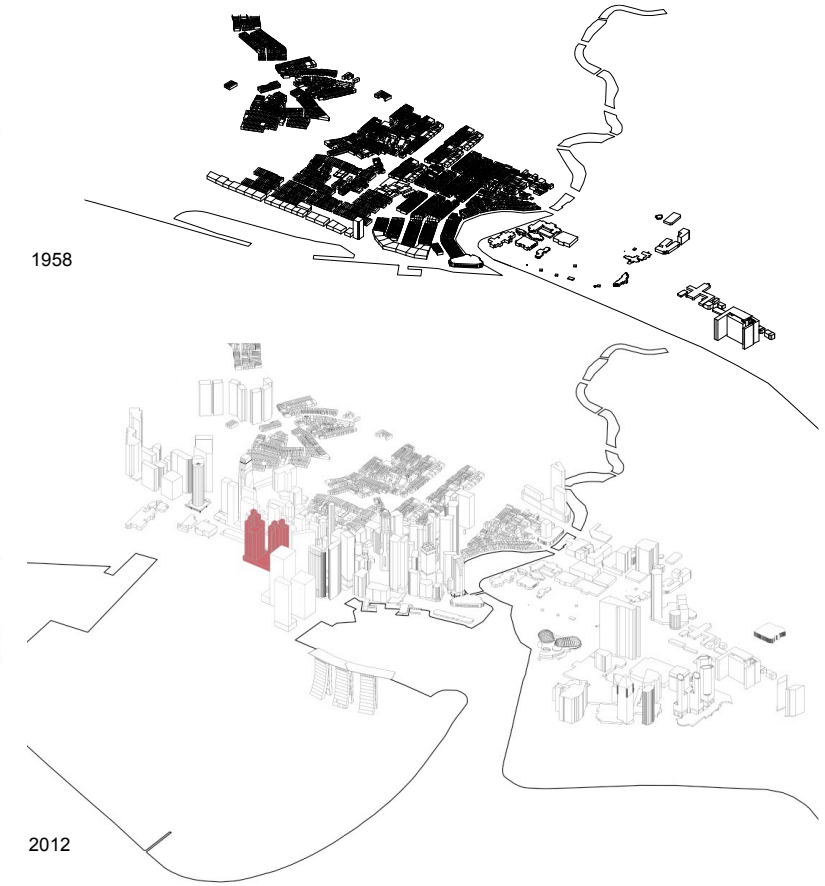
Resource Hinterland

Sand sourcing for Singapore



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Model Land

Singapore’s topography 2012

1924

Model Land

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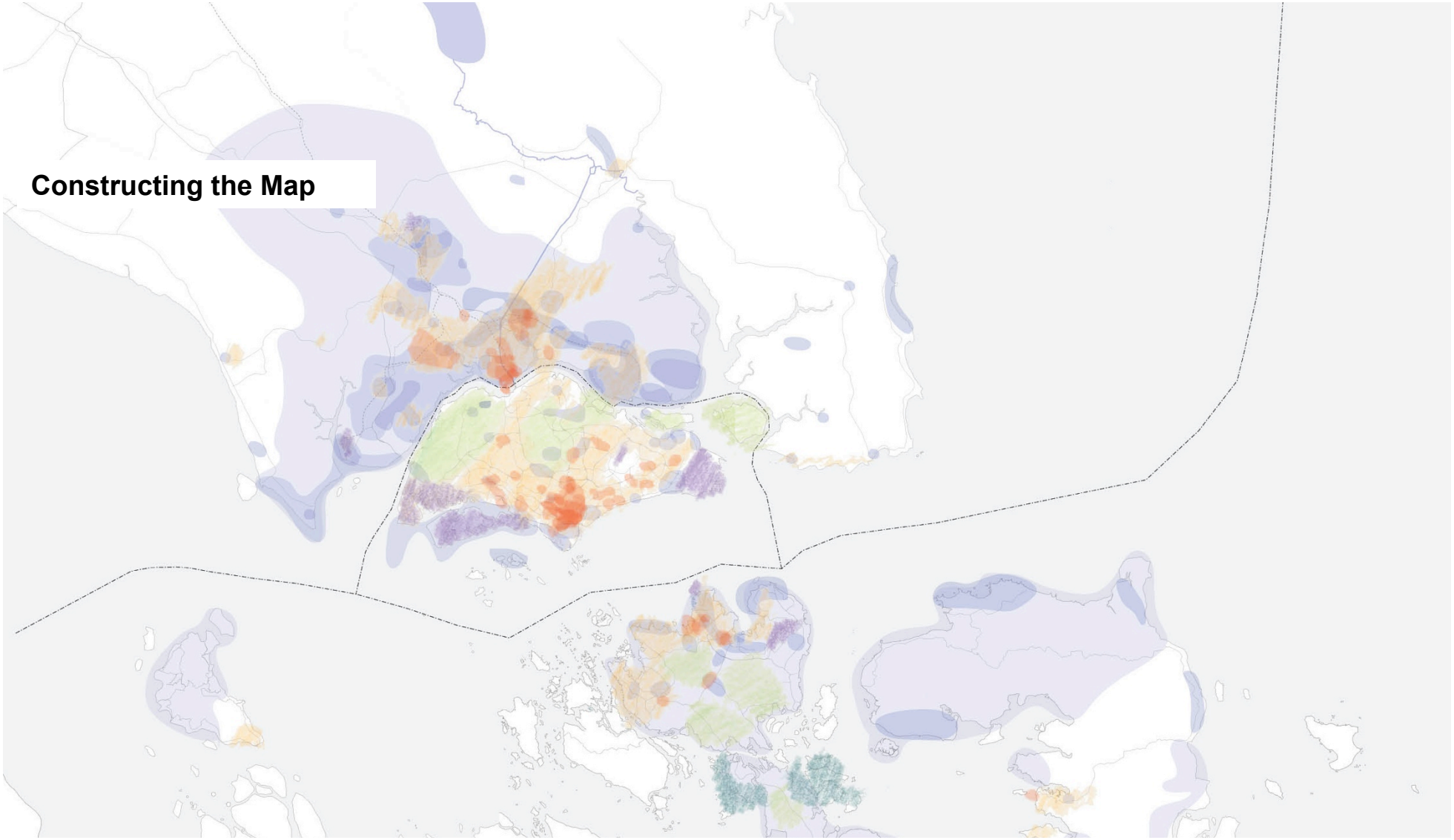
Constructing the Map



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  - https://www.edx.org/course/ethx/ethx-fc-01x-future-cities-1821
- The BOOK – Basic Open Offline Knowledge
  - Information Cities