About… Information

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Outline

Introduction
Methodology
Applications
- Data acquisition
- Data processing
- Data analysis

Conclusion
- Some questions

INTRODUCTION

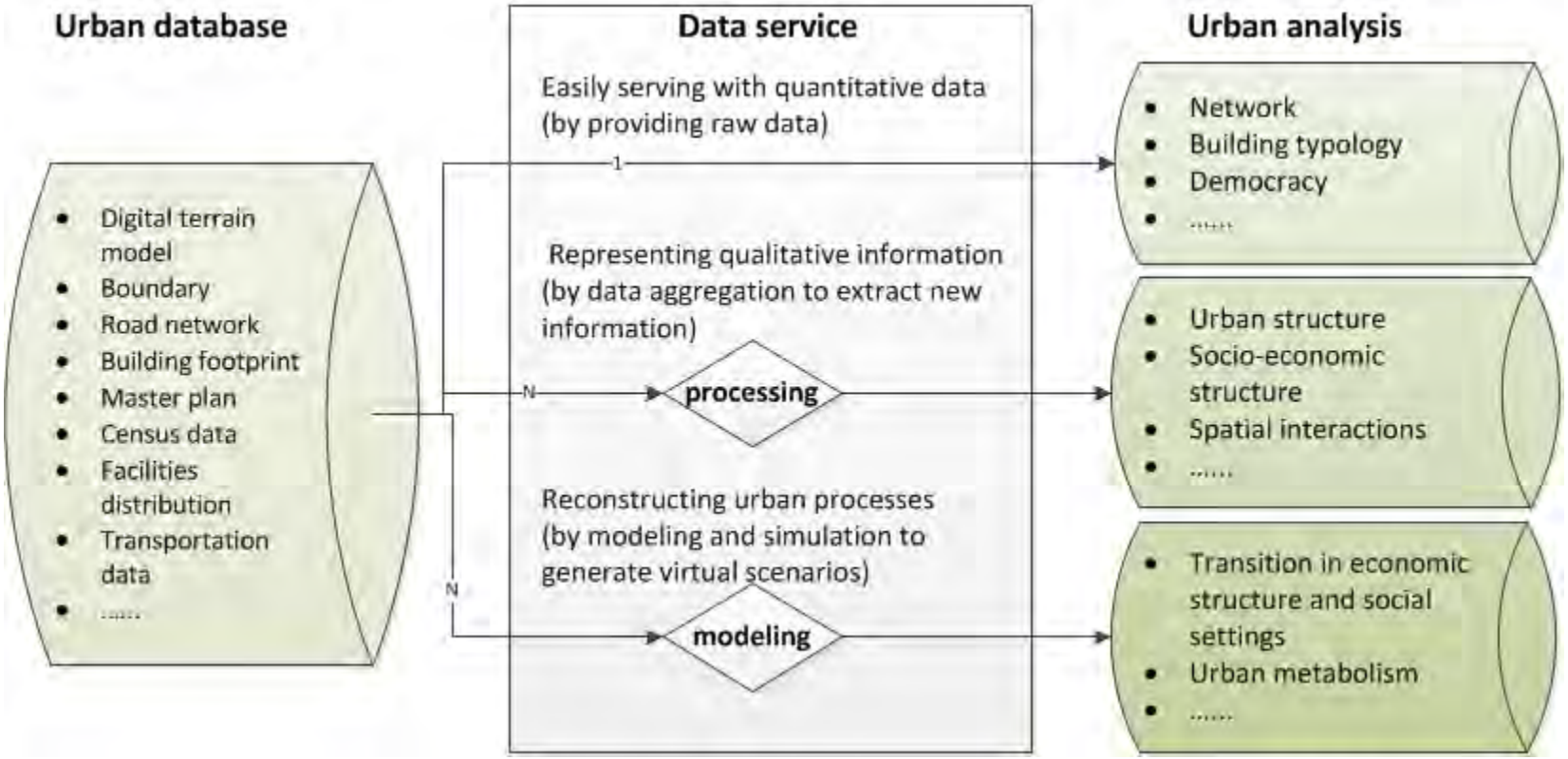
Motivation:

Find new methods for a better understanding of the ever growing urban data.
Make this knowledge available to decision makers, urban planners and stakeholders.

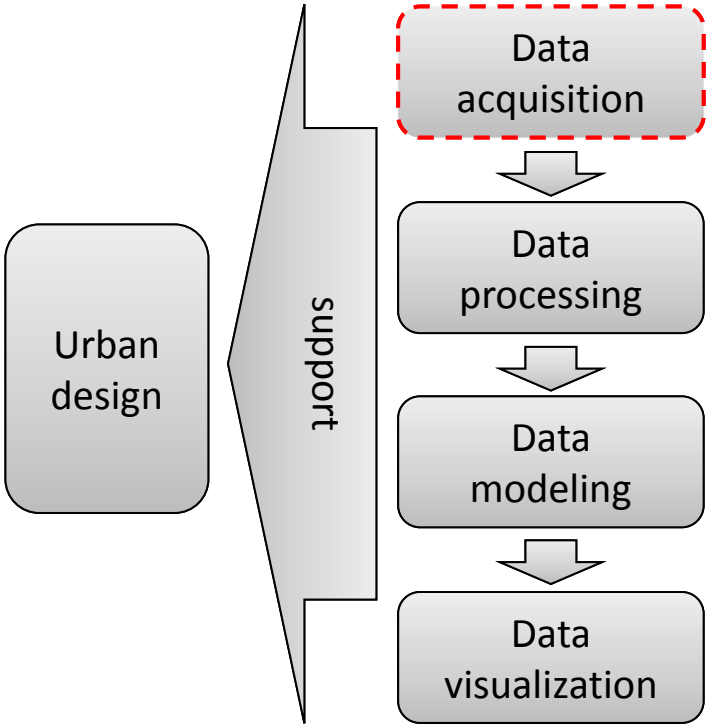
Content:

This presentation introduces the work in progress of the simulation platform since last year, manifested as a workflow from data acquisition, data modelling to data visualization. The presentation concludes two parts: overall methodology and concrete case studies.

METHODLOGY – Three levels of data service to support urban design

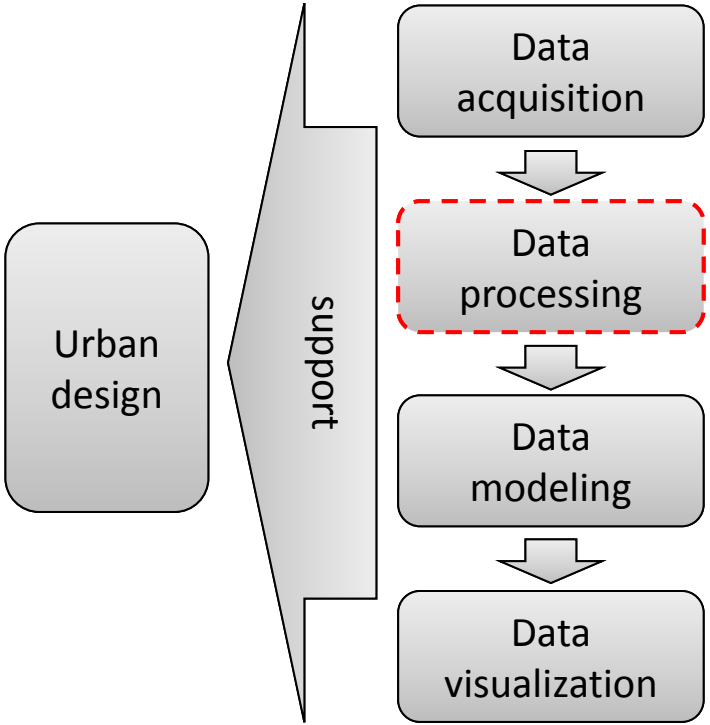


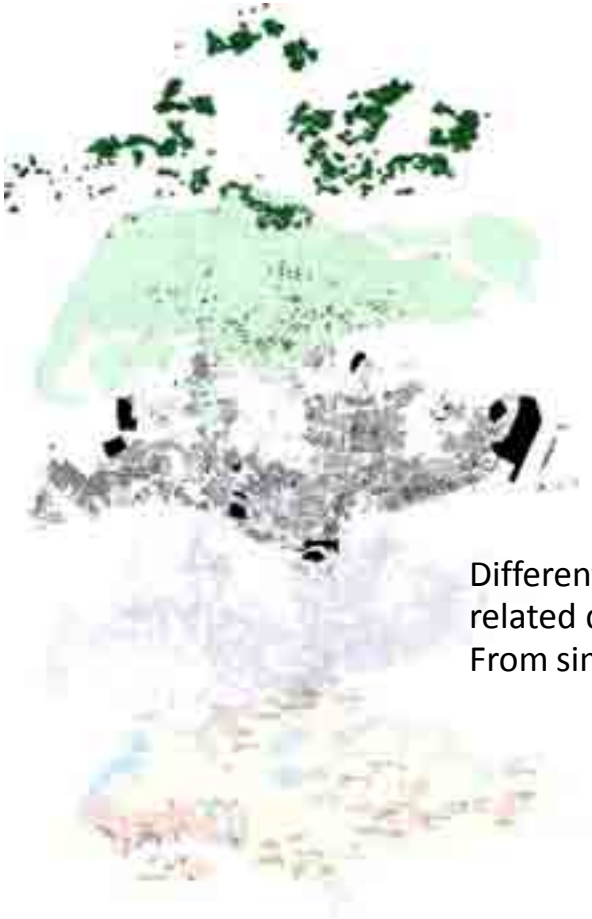
METHODLOGY – A work flow for data service



Reality-based acquisition of geometry through photogrammetry and laser-scans
(Rong Jun Qin & Xianfeng Huang,
From simulation platform)

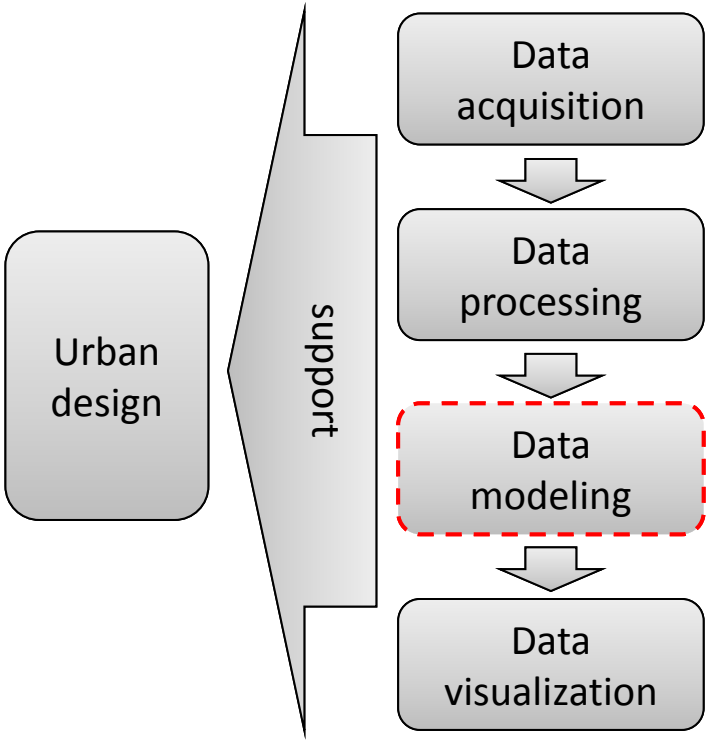
METHODLOGY – A work flow for data service

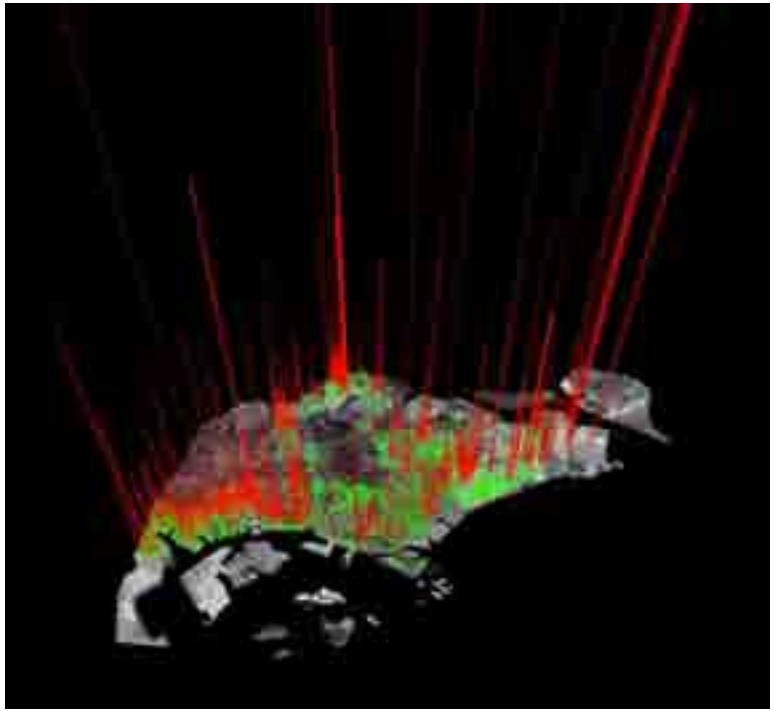




Different layers of urban related data
From simulation platform

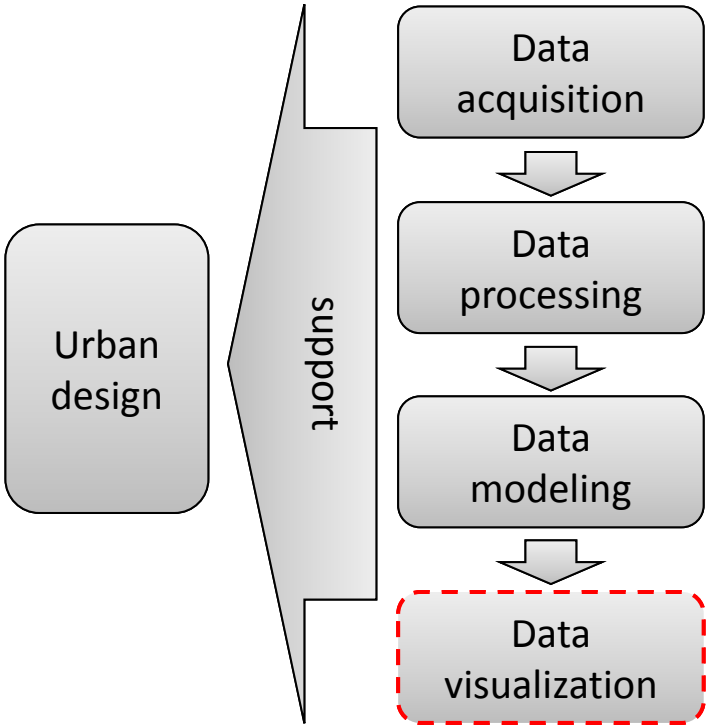
METHODLOGY – A work flow for data service

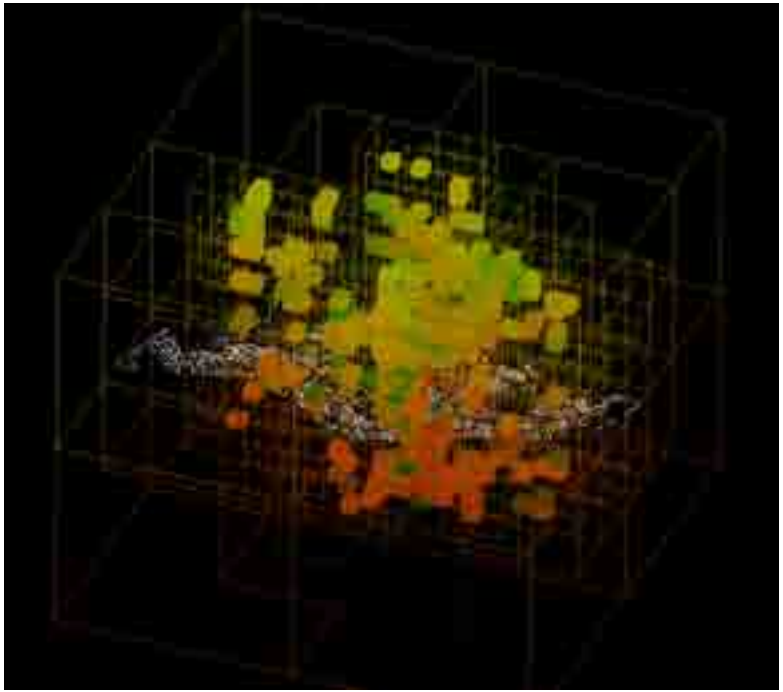




Energy consumption modeling of Singapore
From simulation platform

METHODLOGY – A work flow for data service





Visualization of Spatiotemporal Data
From simulation platform

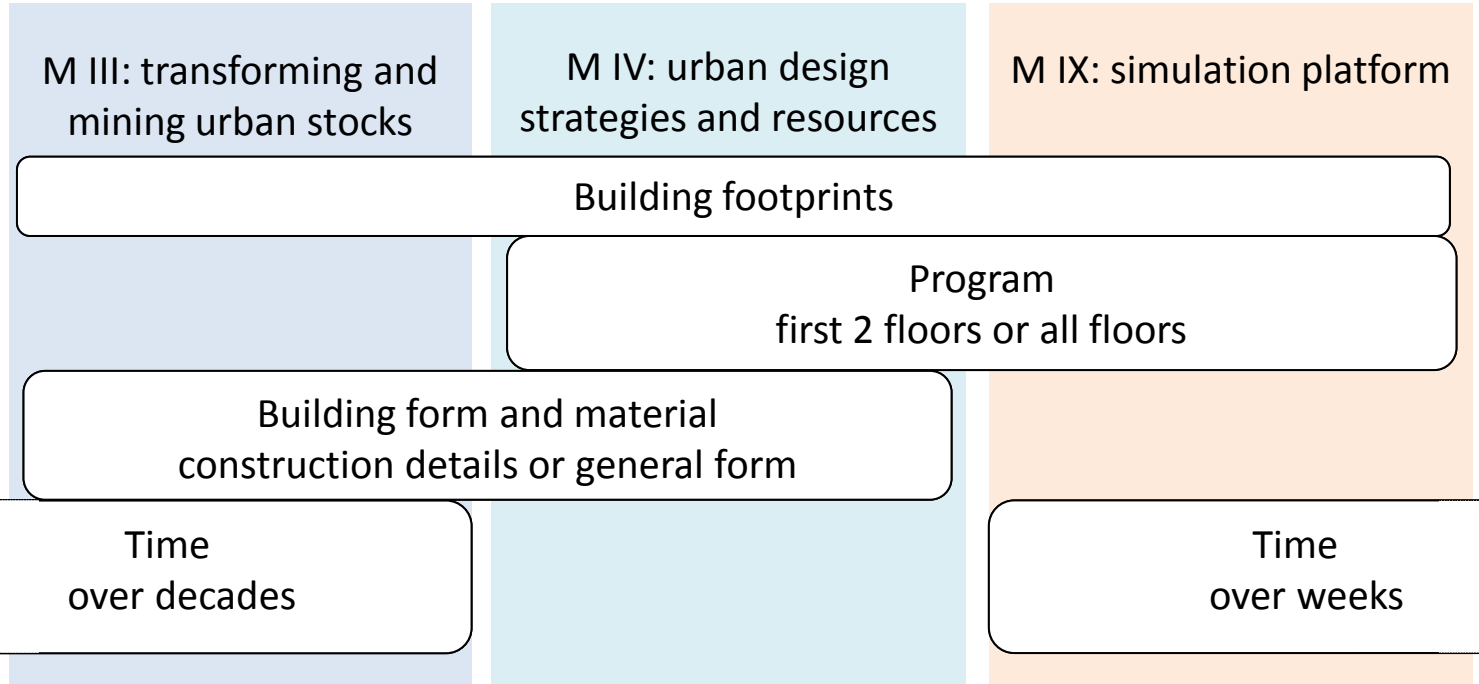
APPLICATION – Data acquisition

Case study 1:

Data acquisition of Rochor area

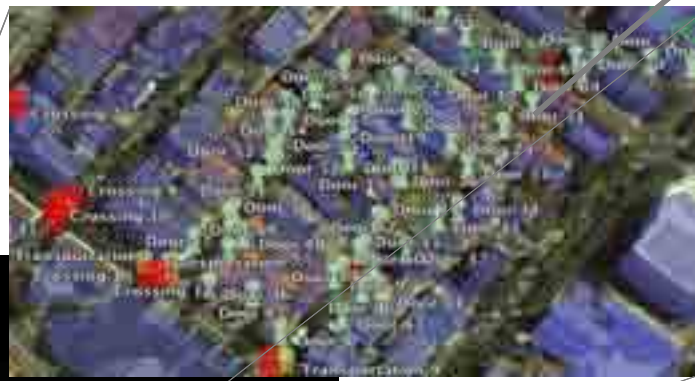
Data needs from Rochor

How to address different data needs to answer multiple research questions based on the same dataset?



Data acquisition from Rochor

Transforming paper into digital data:



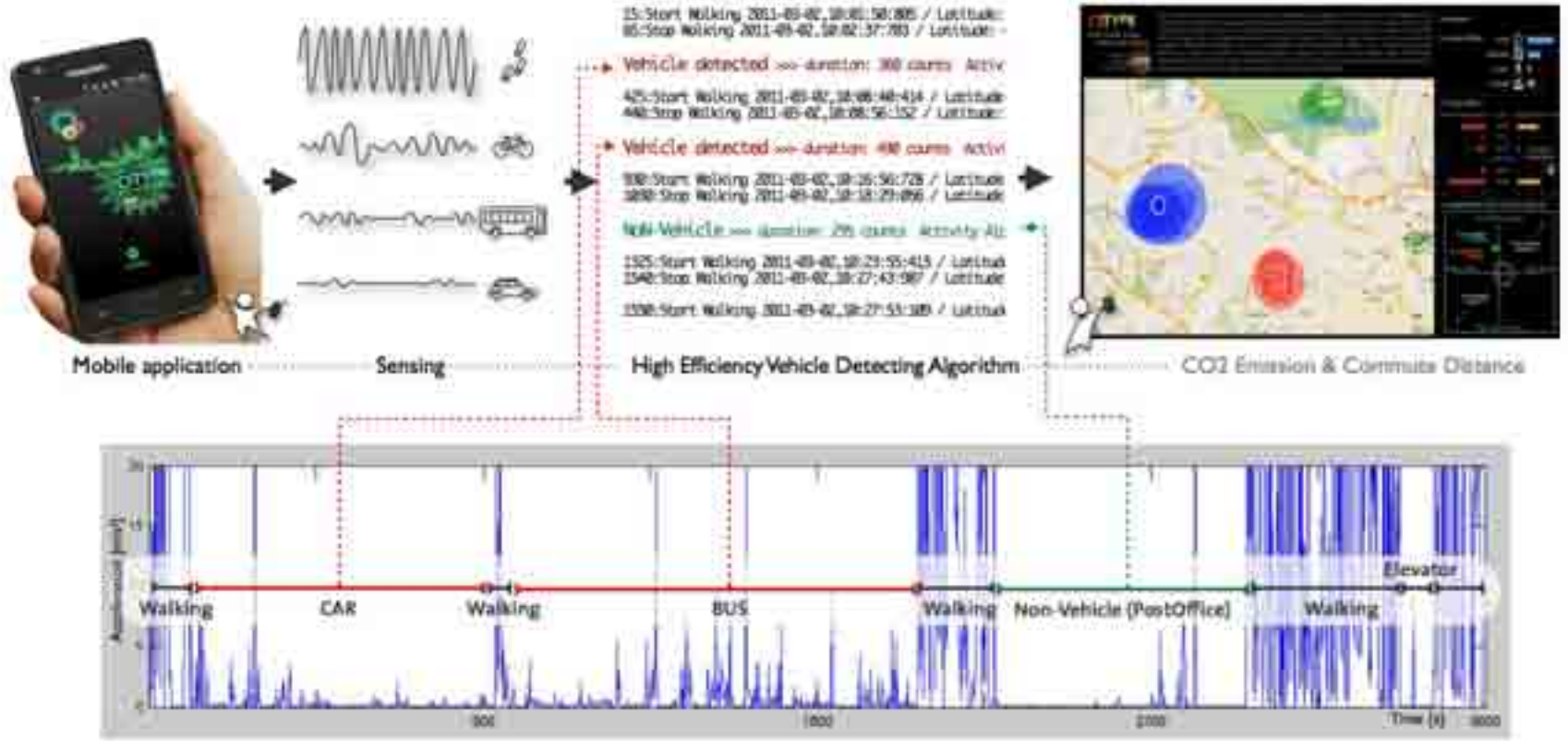
building criterion	subcriteria	value			
building name/complex name			Presbyterian Church		Moby Chapel
building / Street facade	complex shape	yes / no	no		
	optional: number of smallest shape units		1	1	
	type of shape	Shophouse			
		Bungalow			
		Semi-detached			
		Terraced house			
		Tower			
		Slab	Slab	Slab?	Slab?
		Roof above ground			
		Podium			
documentation	Street facade				
	Model				
	building proposal				
	Street Name			Privacy Street	
	Block Number			77	
	Postcode		188649	188649	
	longitude				
	latitude				
	GPS coordinates				
storeys	above ground		1	1	1
	below ground		0	0	0
age	Guessed				
	Indicated		1933	1960	1843
use	mixed-use	yes / no			yes?
	residential	number of storeys			
	HDB				
	condo				
	landed property				
	hotel				
	boarding house				
	non-residential	number of storeys			
	office				
	industrial				
	commercial				
	religious		1	1–4	1
	institutional				
	recreational				
ownership	building not occupied	yes / no			
	tenure type				
	tenure start				
Units	Number of units		17	7	1

Entrance/Exit	to which Road	Name
	size	Pedestrian
		Car
		2 Cars
	Controlled	time
		person
		swipe card
		not
	passage to other streets	Name

APPLICATION – Data acquisition and processing

Case study 2:

Strategies for transportation mode detection and visualization of crowdsourcing data

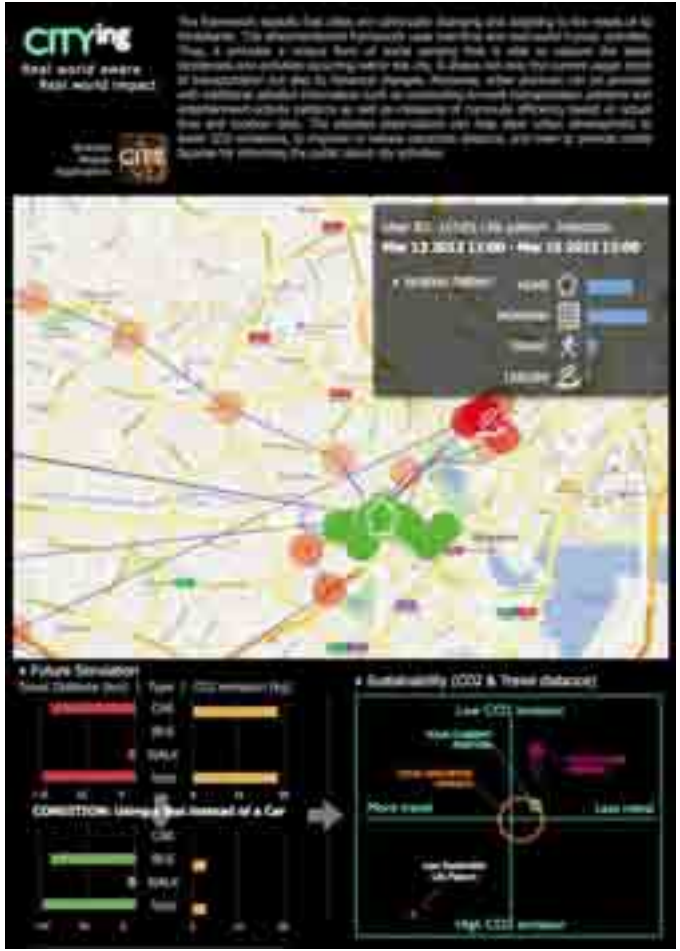

Mobile application
Sensing
High Efficiency Vehicle Detecting Algorithm
CO2 Emission & Commute Distance
Walking
CAR
Walking
BUS
Walking
Non-Vehicle (PostOffice)
Walking
Elevator

CITYing

Real world aware
Real world impact

Crowdsourcing urban data collection using smartphone


CITYing
Real world aware
Real world impact
▲ Travel Report
▲ Pattern Analysis


CITYing
Real world aware
Real world impact
▲ Future Simulation
▲ Sustainability (CO2 & Travel distance)

APPLICATION – Data processing and analysis

Case study 3:

Representing mixed-use of urban space by analyzing transportation data

Step 1: Transform transportation data to analyze urban activities by GIS tool

Example1: Table data transformed as polylines showing how people go in and out of Jurong east area

Example2: Number of people boarding and alighting at certain time of a day.

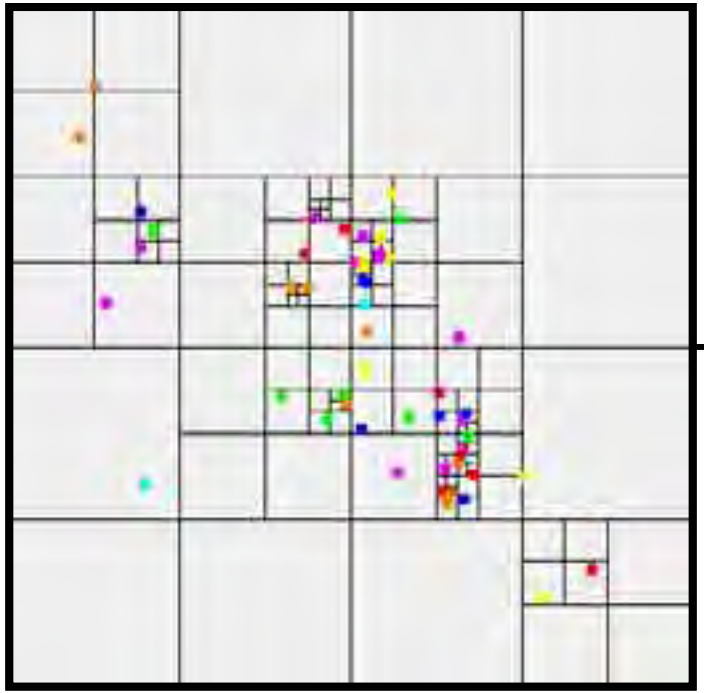
Example3: Most active area of mobility on Monday

Example4: Classifying trips by time, distance and people group

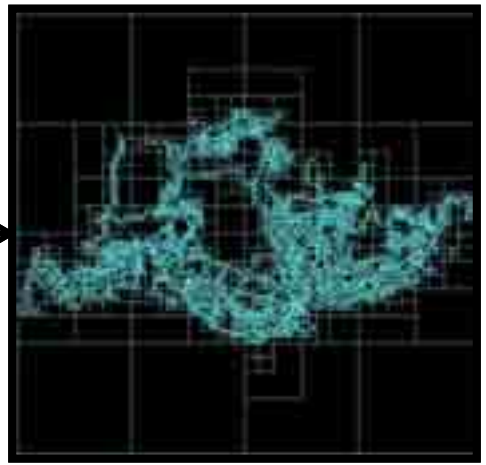
Example5: Estimated distributions of activities by buffering analysis.

Example 6: Gravity model to analysis the interactions between planning areas (Jurong east and other areas)

Step 2: Use analyzed results to classify urban activities, and split the spatiotemporal urban space into sub functional spaces.



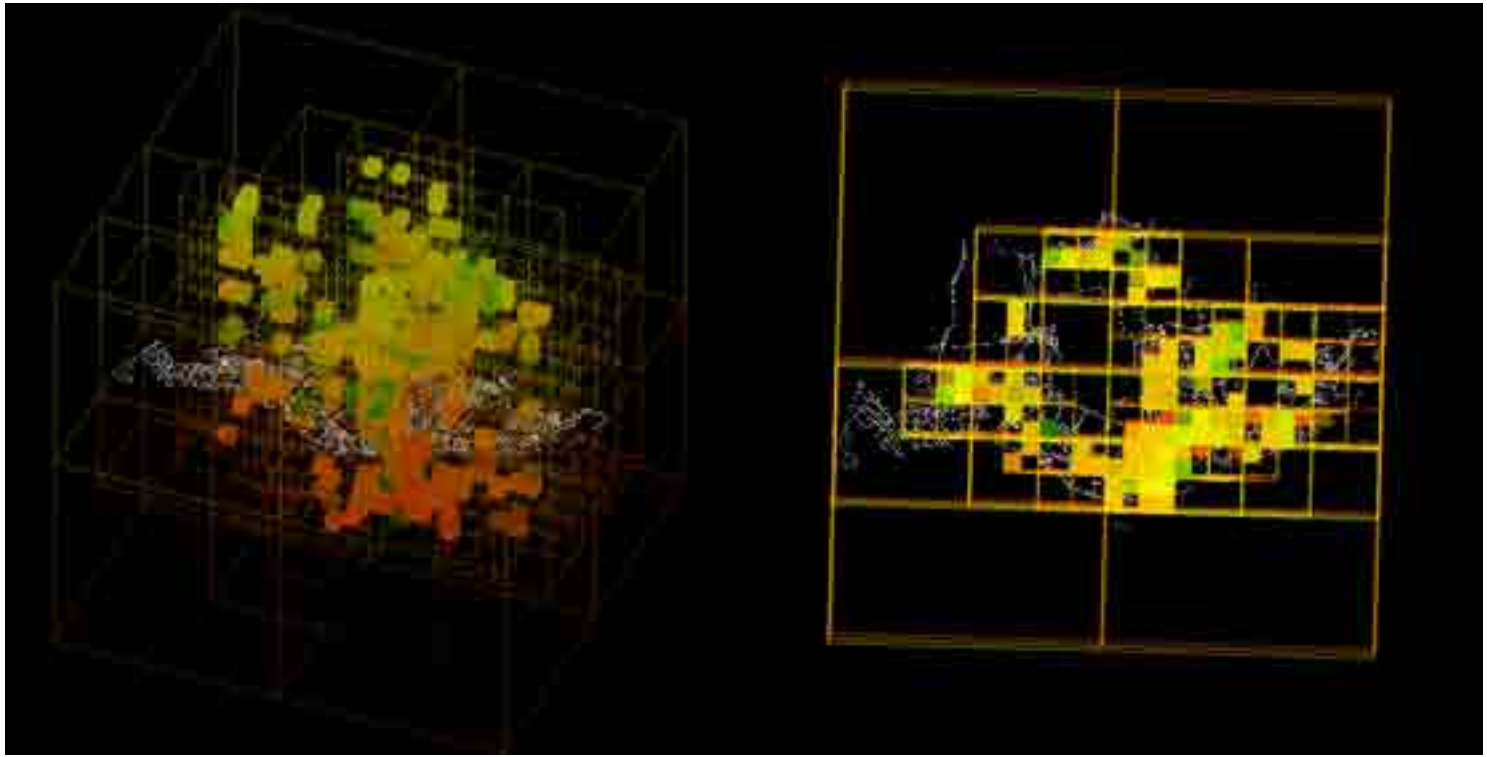
Demonstration of quad-tree

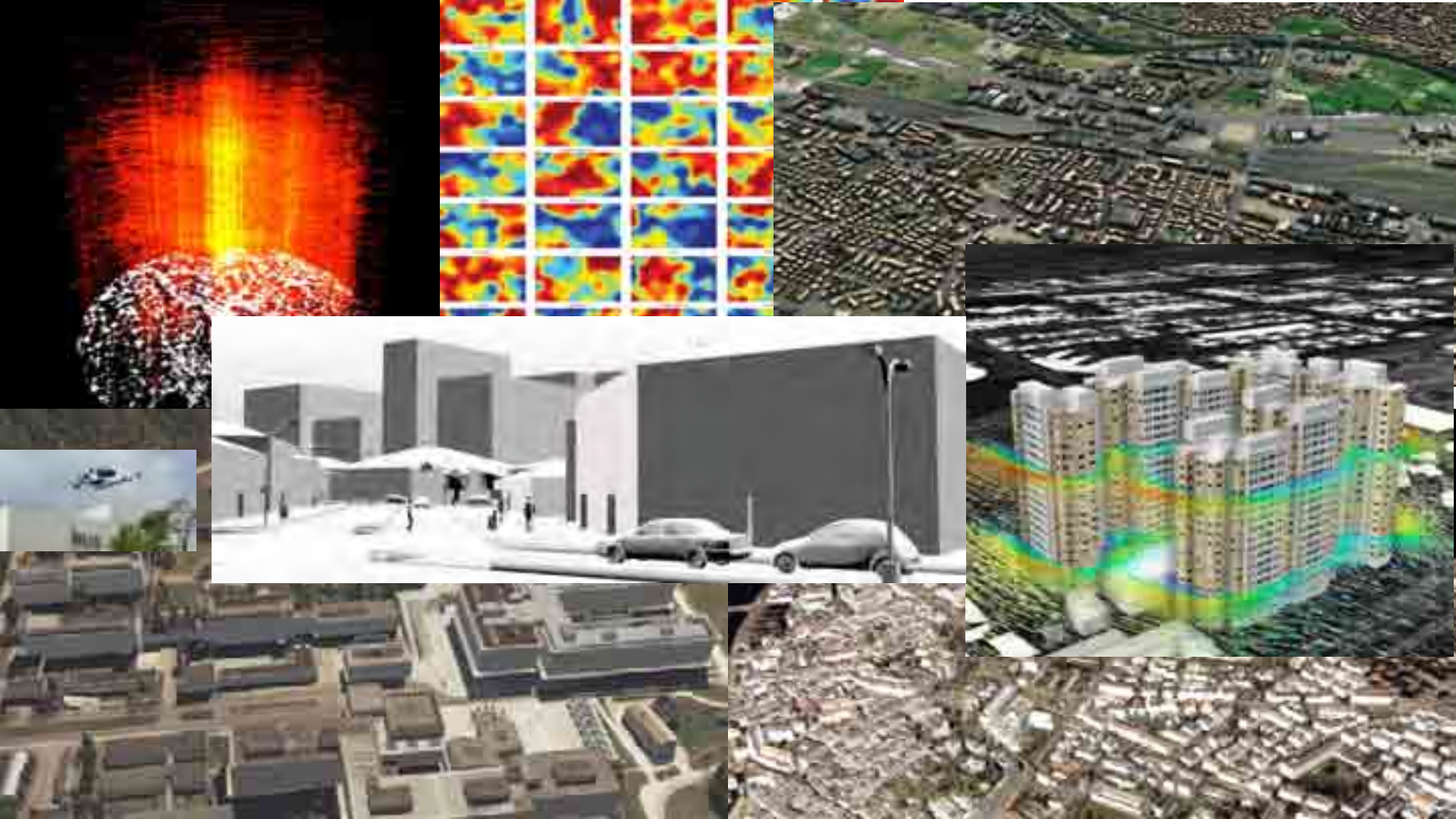


Mapping Spatial data

Mapping
Spatiotemporal data

Step 3: Visual analytics tool to estimate the mixed-use of urban space by density, diversity, and distribution.





CONCLUSION & FUTURE WORK

Research questions pointing out future direction:

To what degree can digital tools help reduce the complexity of the design process by using and activating the information to generate future scenarios?

To what degree can digital tools help reduce the complexity of urban phenomena by analyzing and reasoning the information?

To what degree can digital tools help reduce the complexity of design tasks by simplifying and organizing the massive data set?

Thanks for your attention !