

About... Information

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Outline

Introduction

Methodology

Applications

- Data acquisition
- Data processing
- Data analysis

Conclusion

- Some questions

INTRODUCTION

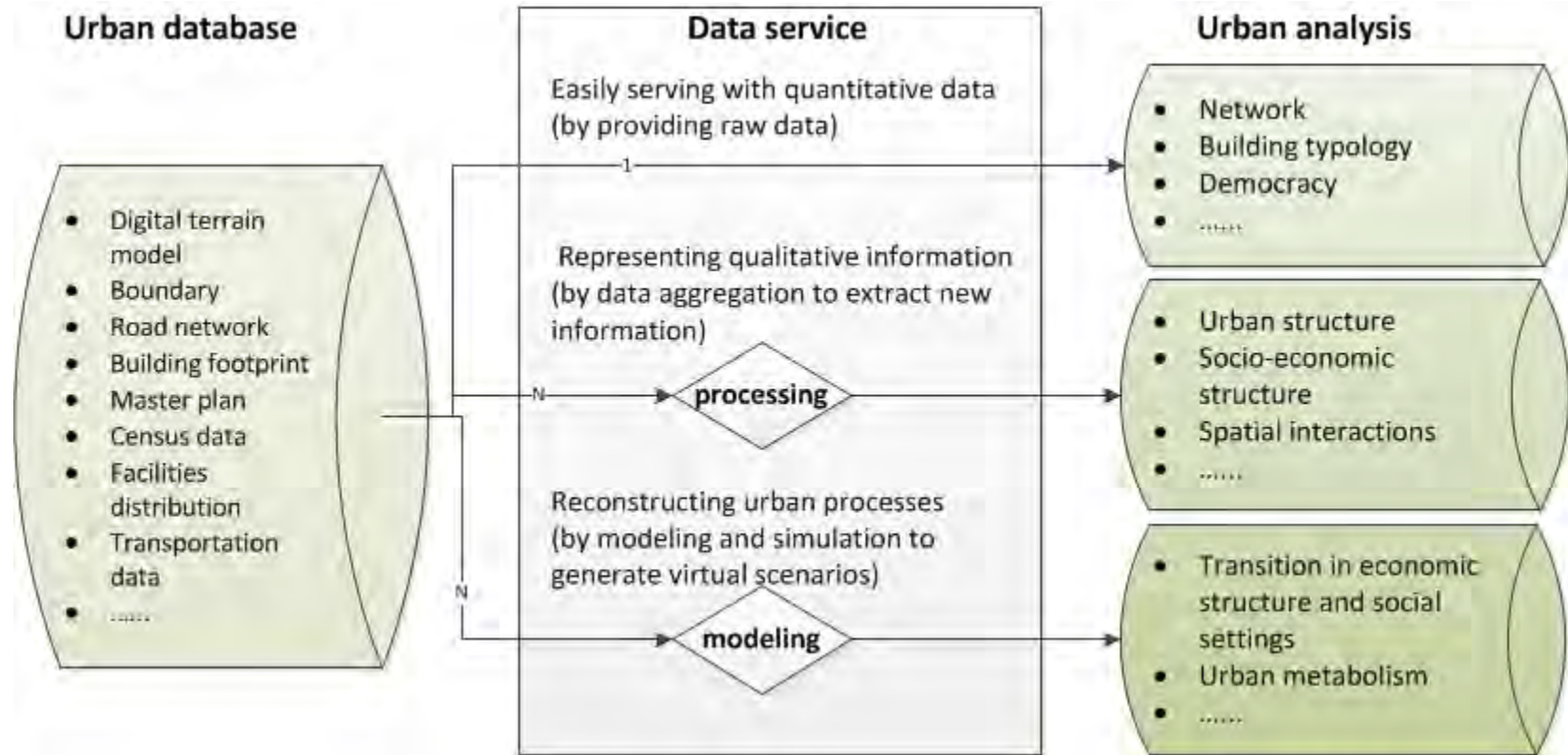
Motivation:

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

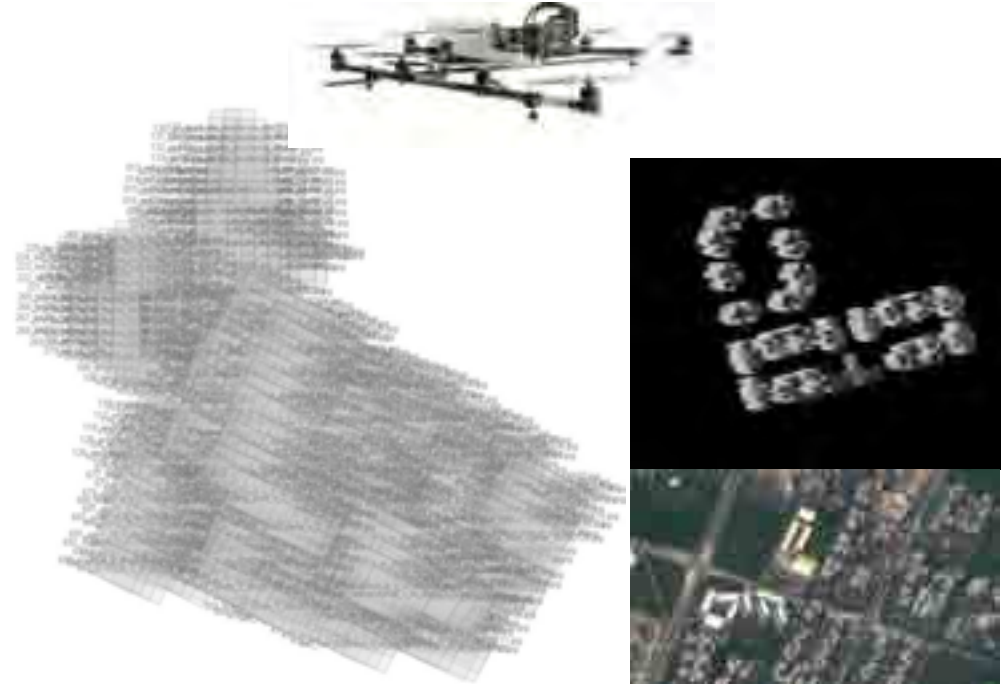
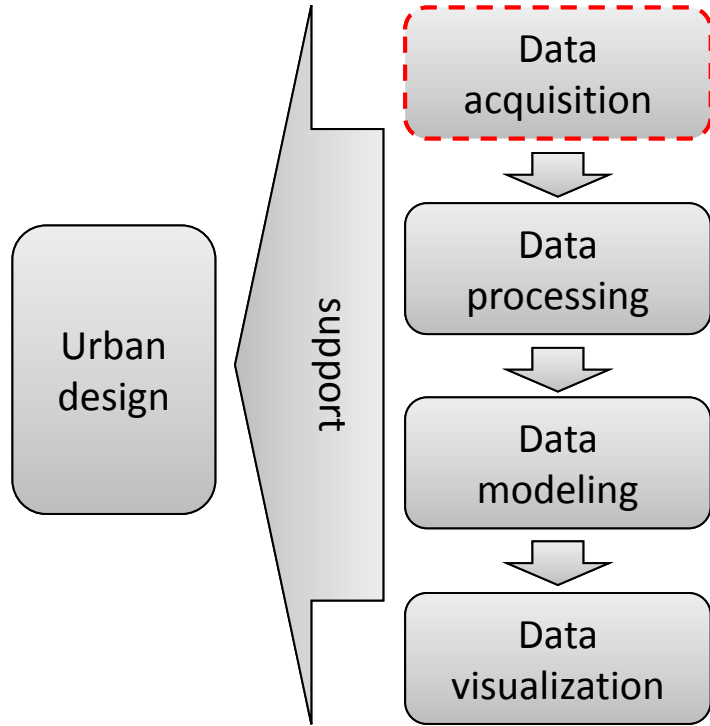
Content:

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.

METHODOLOGY – Three levels of data service to support urban design

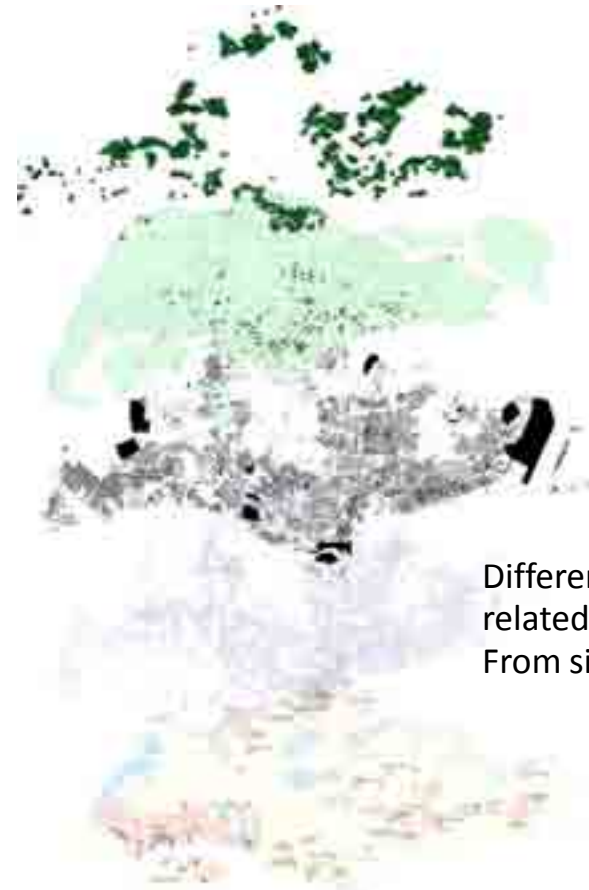
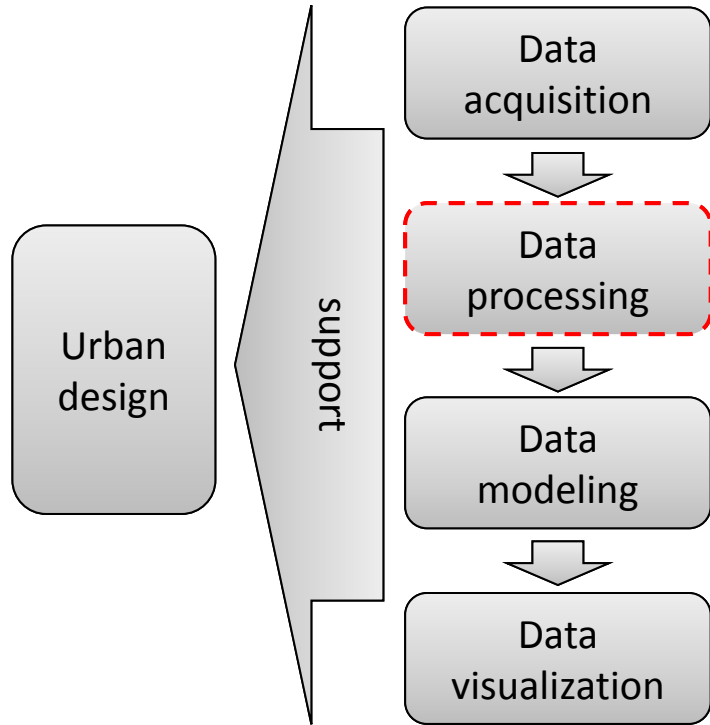


METHODOLOGY – A work flow for data service



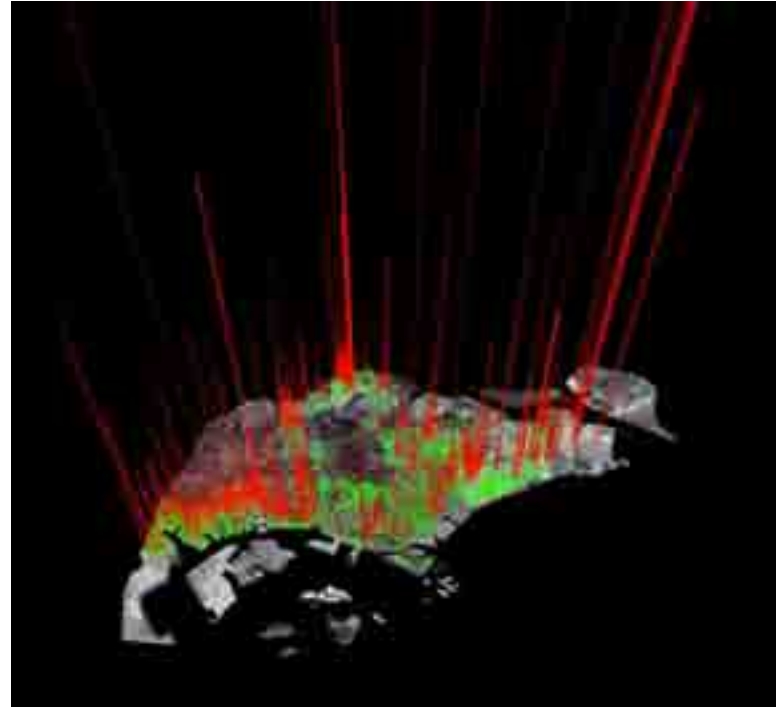
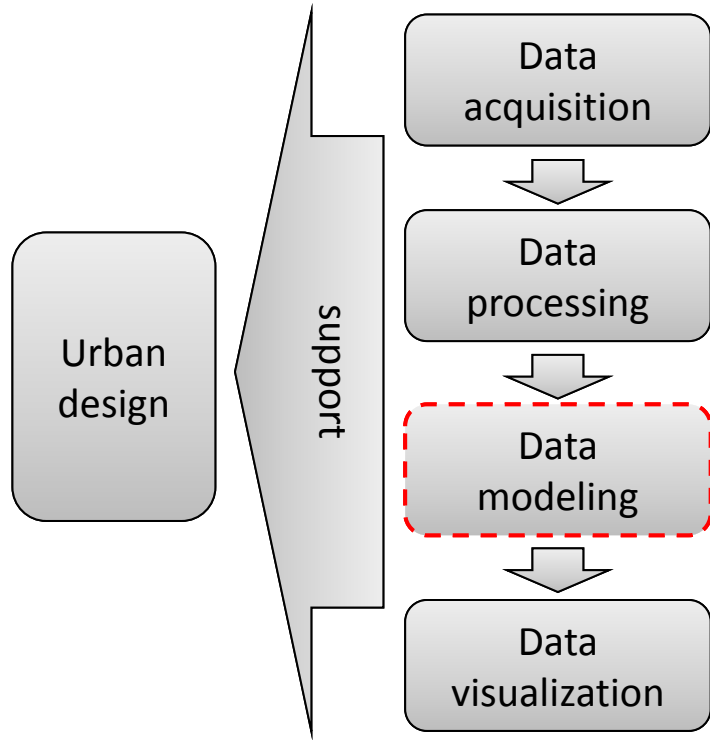
Reality-based acquisition of geometry through photogrammetry and laser-scans (Rong Jun Qin & Xianfeng Huang, From simulation platform)

METHODOLOGY – A work flow for data service



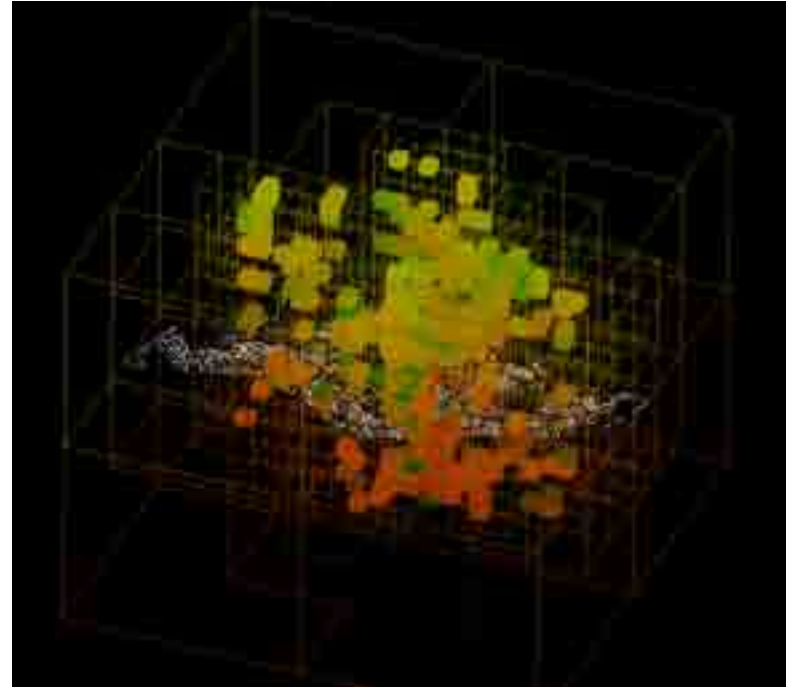
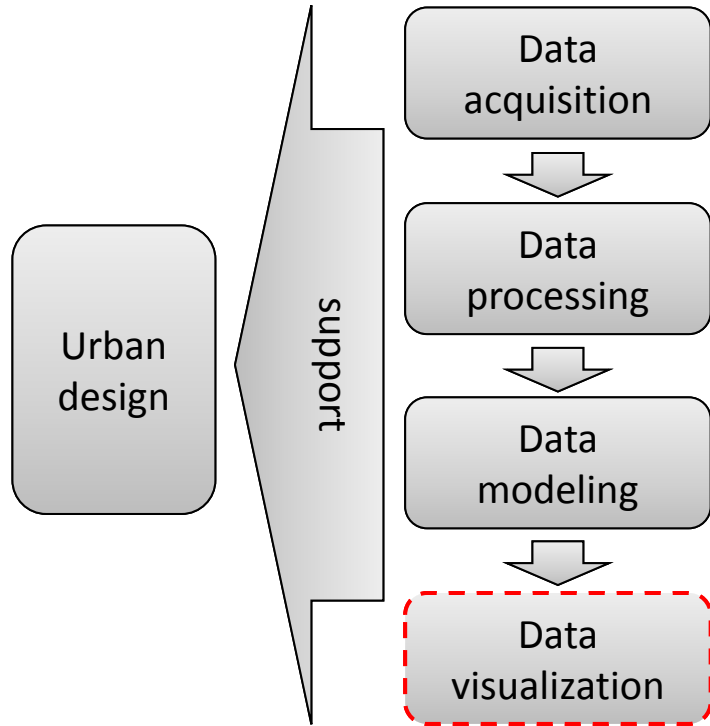
Different layers of urban related data
From simulation platform

METHODOLOGY – A work flow for data service



Energy consumption modeling of Singapore
From simulation platform

METHODOLOGY – 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?

M III: transforming and mining urban stocks

M IV: urban design strategies and resources

M IX: simulation platform

Building footprints

Program
first 2 floors or all floors

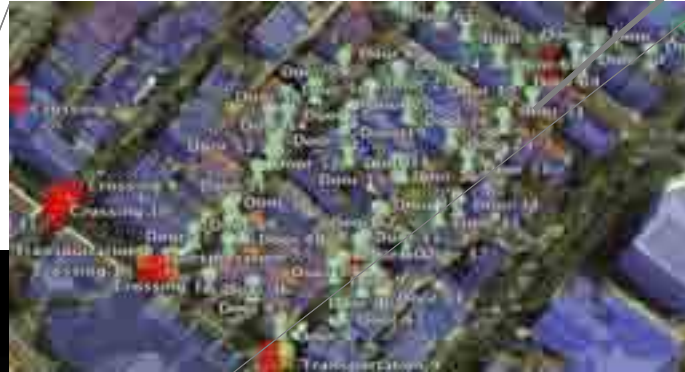
Building form and material
construction details or general form

Time
over decades

Time
over weeks

Data acquisition from Rochor

Transforming paper into digital data:



| Building reference | Reference | Value | Freeform | Freeform |
|---------------------------|---------------------------|----------|----------|----------|
| Building reference name | building reference name | Freeform | Freeform | Freeform |
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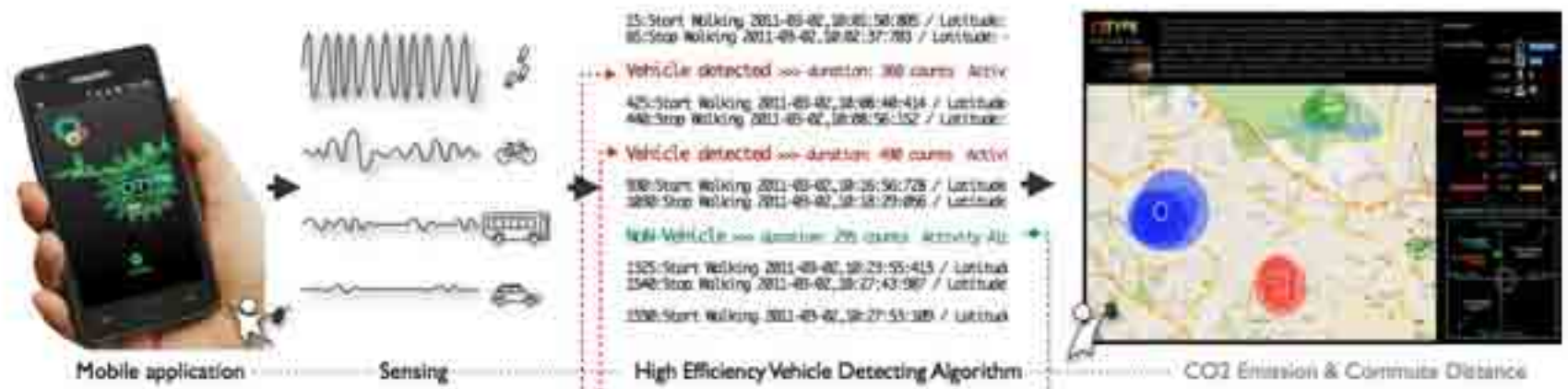
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|---------------|--------------------------|------------|
| Entrance/Exit | to which Road | Name |
| | size | Pedestrian |
| | | Car |
| | | 2 Cars |
| | Controlled | time |
| | | person |
| | | swipe card |
| | | not |
| | passage to other streets | Name |

| Building reference | Reference | Value | Freeform | Freeform |
|--------------------|--------------------|----------|----------|----------|
| Building reference | Building reference | Freeform | Freeform | Freeform |
| Building reference | Building reference | Freeform | Freeform | Freeform |
| Building reference | Building reference | Freeform | Freeform | Freeform |

APPLICATION – Data acquisition and processing

Case study 2:

Strategies for transportation mode detection and visualization of crowdsourcing data



15: Start Walking 2011-09-02, 10:01:50:805 / Latitude: 45
 85: Stop Walking 2011-09-02, 10:02:37:703 / Latitude: -

Vehicle detected >>> duration: 300 cars Activ

425: Start Walking 2011-09-02, 10:06:40:434 / Latitude: 440
 440: Stop Walking 2011-09-02, 10:08:56:152 / Latitude: -

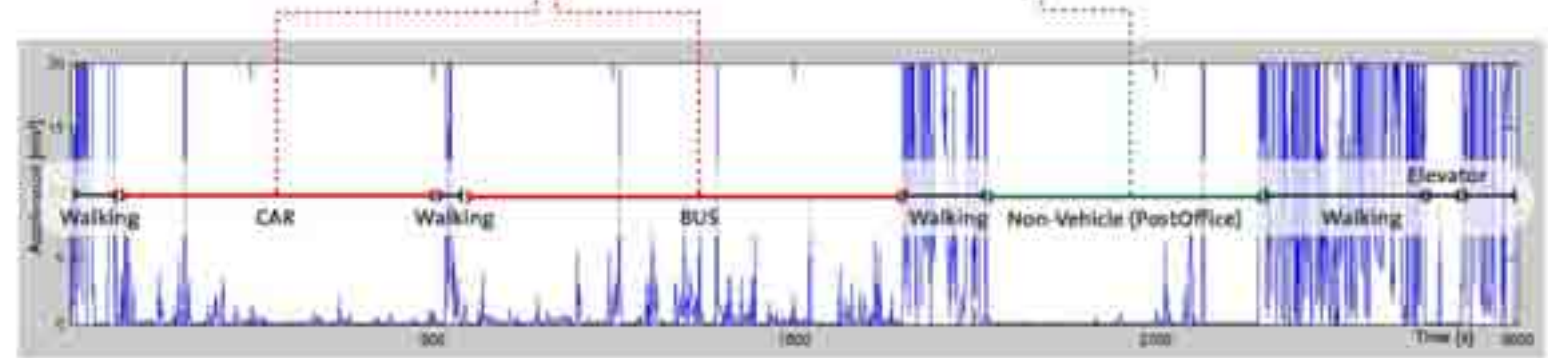
Vehicle detected >>> duration: 80 cars Activ

830: Start Walking 2011-09-02, 10:26:50:728 / Latitude: 3800
 880: Stop Walking 2011-09-02, 10:28:29:096 / Latitude: -

Non-Vehicle >>> duration: 200 cars activity All

1325: Start Walking 2011-09-02, 10:29:55:415 / Latitude: 3540
 1340: Stop Walking 2011-09-02, 10:27:43:907 / Latitude: -

1500: Start walking 2011-09-02, 10:27:55:309 / Latitude: -



CITYing

Real world aware
Real world impact



Crowdsourcing urban data collection
using smartphone



citying
Real world aware
Real world impact

The framework models how cities are currently planning and operating to be ready for a disaster. The assumptions framework uses metrics and national trends to guide. This is a private & secure form of data meaning that it is able to support the best resources and policies occurring within the city. It does not rely on current usage level of transportation for the city to forecast changes. However, other services can be provided with additional detailed information such as connecting through transportation systems and infrastructure/active systems as well as measures of community efficiency based on actual time and location data. The detailed information can help state urban development to meet CO2 emissions, to improve or reduce emissions, distance, and travel time only through by improving the public road by providing.

User ID: 10101 (46) Admin: 10/01/2011 11:00

Legend: Roads, Buildings, etc.

Travel Pattern

| Travel Distance (km) | Mode | CO2 emission (kg) |
|----------------------|--------|-------------------|
| 1000 | Car | 100 |
| 1000 | Bike | 10 |
| 1000 | Public | 5 |
| 1000 | Walk | 1 |

Pattern Analysis

100m

Public Transportation

Walk

citying
Real world aware
Real world impact

The framework models how cities are currently planning and operating to be ready for a disaster. The assumptions framework uses metrics and national trends to guide. This is a private & secure form of data meaning that it is able to support the best resources and policies occurring within the city. It does not rely on current usage level of transportation for the city to forecast changes. However, other services can be provided with additional detailed information such as connecting through transportation systems and infrastructure/active systems as well as measures of community efficiency based on actual time and location data. The detailed information can help state urban development to meet CO2 emissions, to improve or reduce emissions, distance, and travel time only through by improving the public road by providing.

User ID: 10101 (46) Admin: 10/01/2011 11:00

Legend: Roads, Buildings, etc.

Future Simulation

| Travel Distance (km) | Type | CO2 emission (kg) |
|----------------------|--------|-------------------|
| 1000 | Car | 100 |
| 1000 | Bike | 10 |
| 1000 | Public | 5 |
| 1000 | Walk | 1 |

Sustainability (CO2 & Travel distance)

Low CO2 emission

High CO2 emission

High CO2 emission

More travel

Less travel

High CO2 emission

High CO2 emission

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



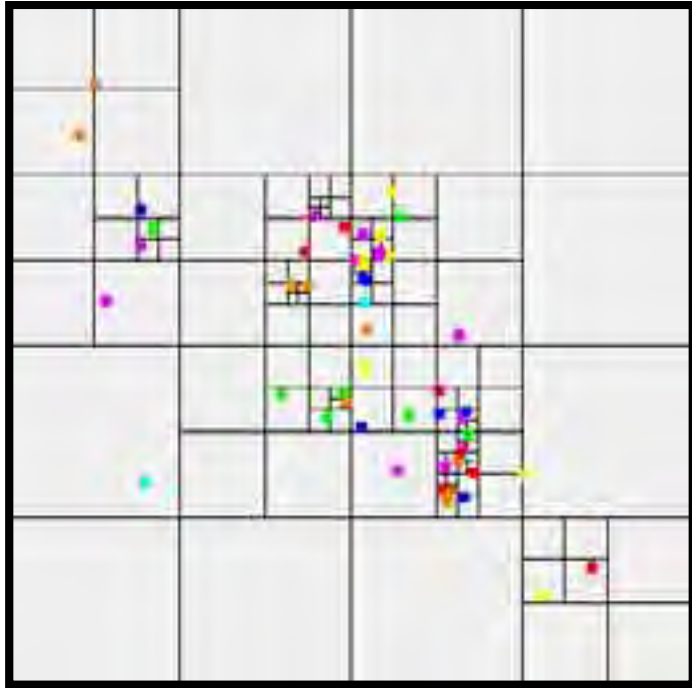
Example5: Estimated distributions of activities by buffering analysis.



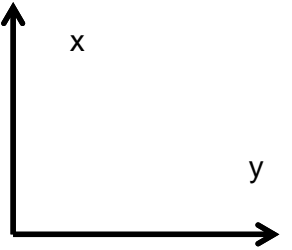
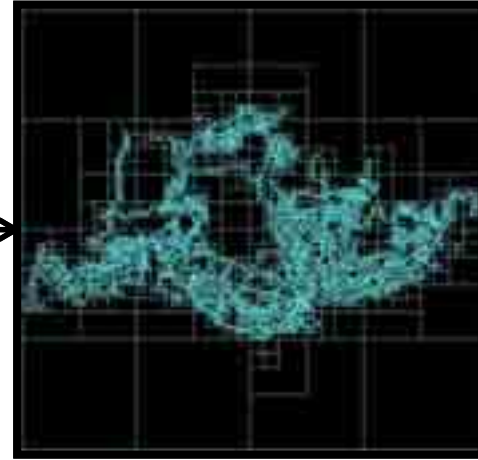
Example 6: Gravity model to analysis the interactions between planning areas (Jurong east and other areas)



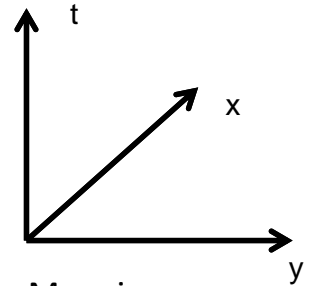
Step 2: Use analyzed results to classify urban activities, and split the spatiotemporal urban space into sub functional spaces.



Demonstration of quad-tree

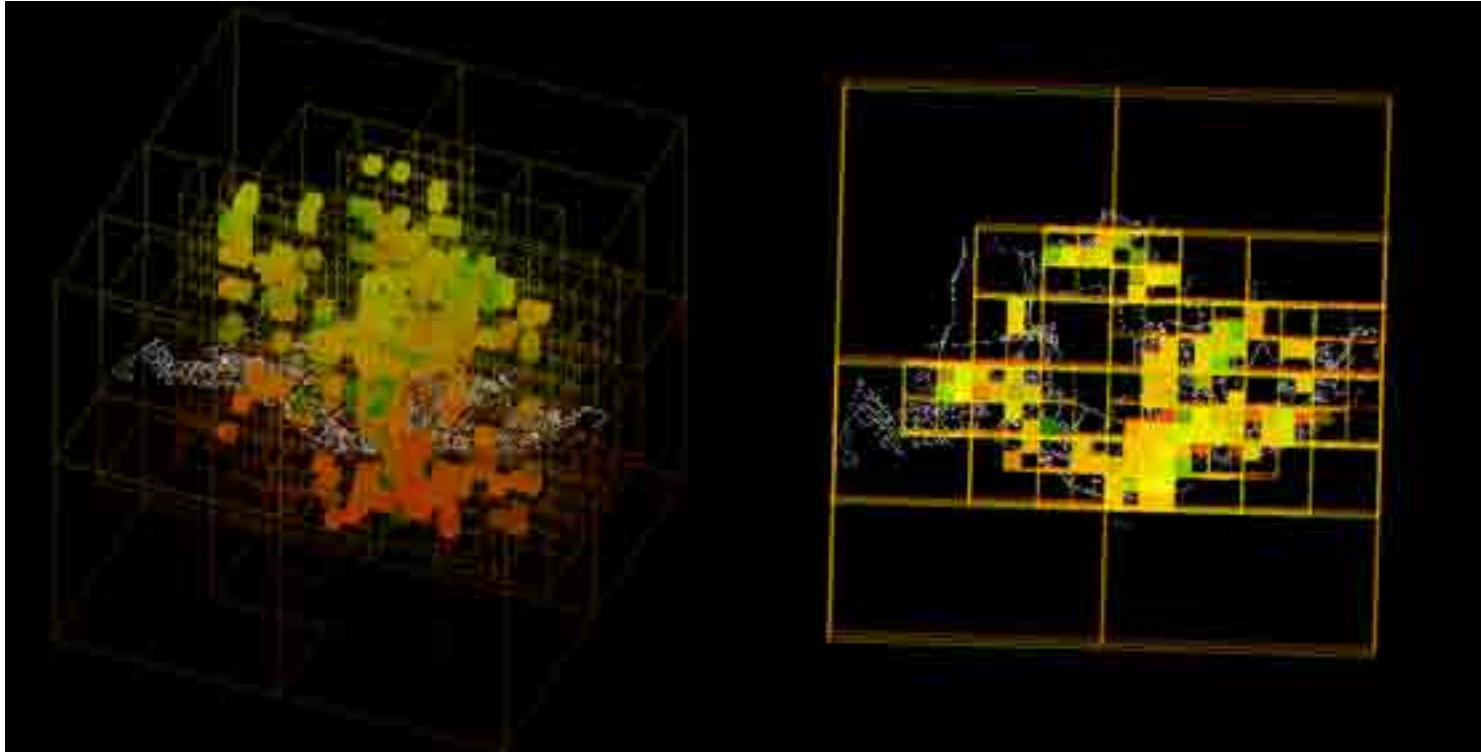


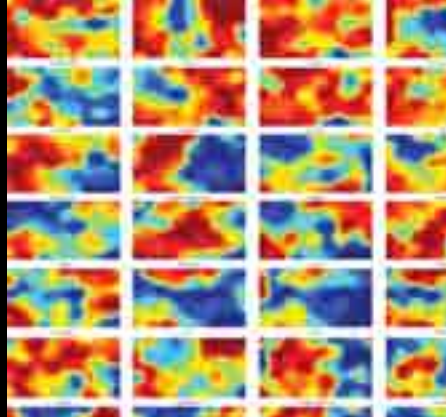
Mapping Spatial data



Mapping Spatiotemporal data

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







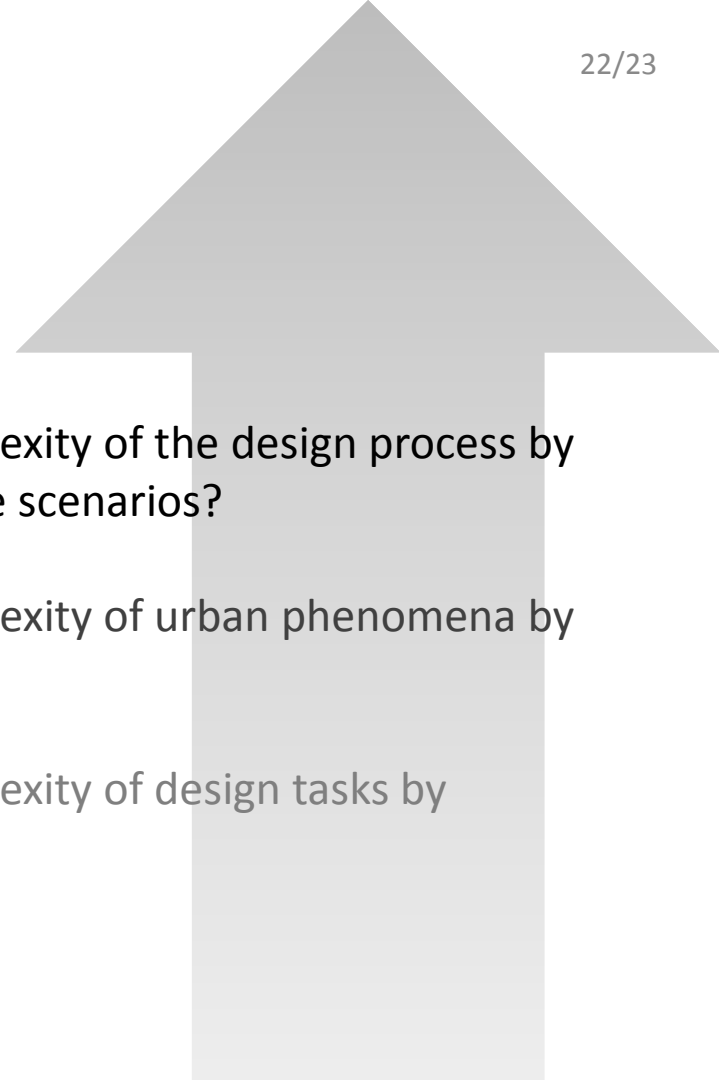
CONCLUSION & FUTURE WORK

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 !