

Decision support tools in transport planning: from research to practice

Alex Erath, Michael van Eggermond,
Pieter Fourie, Artem Chakirov

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

ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Advantages and challenges of new transport models

Agent based, activity-based modeling

- New modeling paradigm
- Interdependency of trips and activities, e.g. tour based mode choice

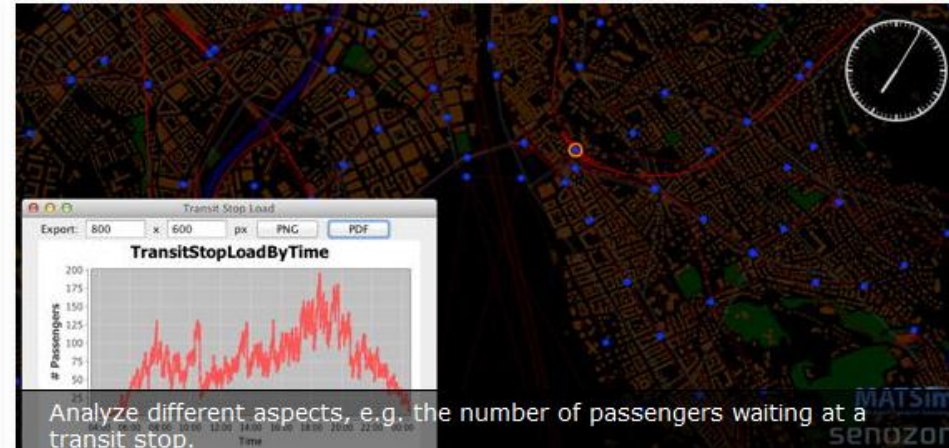
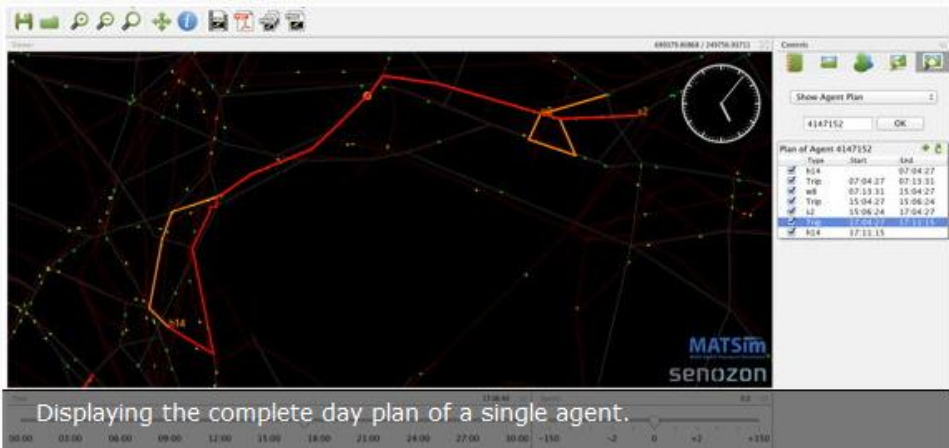
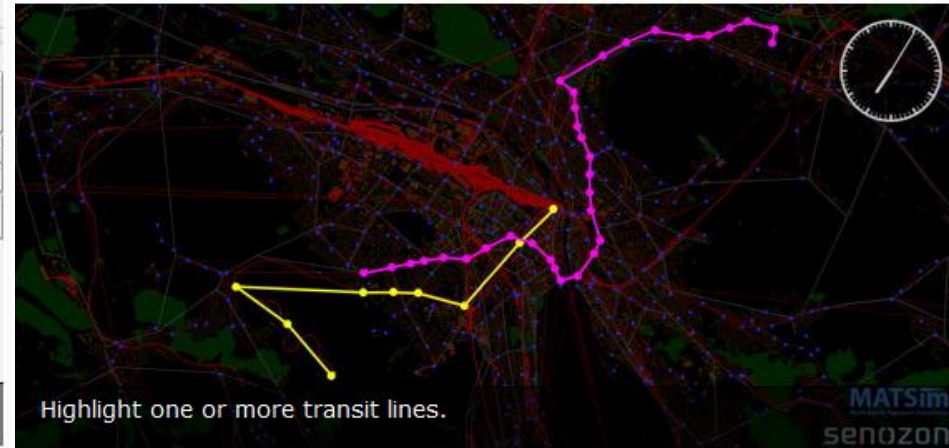
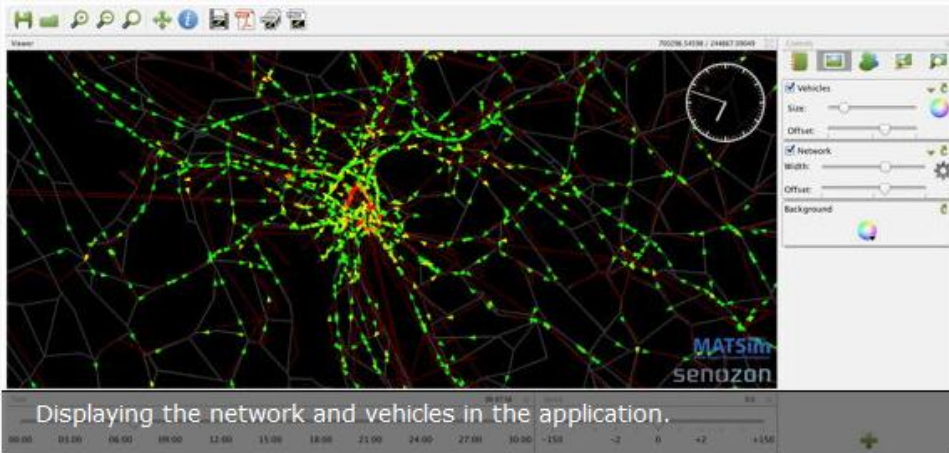
Possible resolution for analysis:

- Individuals
- Parcel or building (or unit) as base unit
- Temporal dynamics

How to deal with the wealth of data?

- Who?
- With how much time?
- What skills?
- New questions?

Current situation I



Current situation II

The screenshot displays the Eclipse IDE with the following components:

- Project Explorer (Left):** Shows a project structure for 'sergioio' with sub-projects like 'playgrounds' and 'src/main/java'. A list of Java files is visible, including 'ChainsAnalyzer.java', 'ComparePlans.java', 'CountTimeBins.java', 'EWLine.java', 'EWNHomeAnalyzer.java', 'LinkData.java', 'Main.java', 'MainEventAnalyzer.java', 'PublicTransportTeleportAnalyzer.java', 'TimeIntervalData.java', and 'TimeSpaceDistribution.java'.
- Code Editor (Center):** Displays the source code for 'TimeSpaceDistribution.java'. The code includes:
 - Method `showSpeedAvgGraph`: Generates an XYLineChart for 'Speed Average'.
 - Method `showTTAvgGraph`: Generates an XYLineChart for 'Travel Time'.
 - Method `showKAvgGraph`: Generates an XYLineChart for 'Concentration'.
- Outline (Right):** Lists the classes and methods in the project, including 'TimeSpaceDistribution' and its various methods like `beginActivityLink`, `enterLink`, `exitLink`, `finishActivityLink`, `getLinkData`, `handleEvent`, `printCSVFiles`, `printTXTFiles`, `resetFiles`, `showDensityAvgGraph`, `showDensityAvgGraph(int, int)`, `showDensityFlowGraph(String)`, `showDensityLinkGraph(String)`, `showDensitySpeedGraph(String)`, `showFlowAvgGraph`, `showFlowAvgGraph(int)`, `showFlowLinkGraph(String)`, `showFlowSpeedGraph(String)`, `showFlowSpeedGraph(int)`, `showLinkGraph(String)`, `showSpeedAvgGraph`, `showSpeedAvgGraph(int, int)`, `showSpeedLinkGraph(String)`, `showTTAvgGraph`, `showTTAvgGraph(int, int)`, `showTTLinkGraph(String)`, and `verifyNewInterval`.

Decision support system for transportation

Transport planners

- How many trips occur where, when and what is the activity purpose?
- What are the socio-demographic characteristics of these persons?

Urban planners:

- What are the temporal usage patterns of buildings and the surrounding neighbourhood?
- What is the flow from public transport stops to surrounding buildings?

Policy-makers

- What are the costs and benefits of a new public transport service?
- Who are the winners and losers from constructing a new road?

Public transport operators

- What is the breakdown of the ridership of certain bus lines?

Service industry

- Which customers are in catchment areas, separated by mode?

Requirements for DSS in transport planning

Functional requirements:

Appraisal

- Cost-benefit
- Winners and losers

Scope

- Journeys
- Stages (but no routes)
- Activities

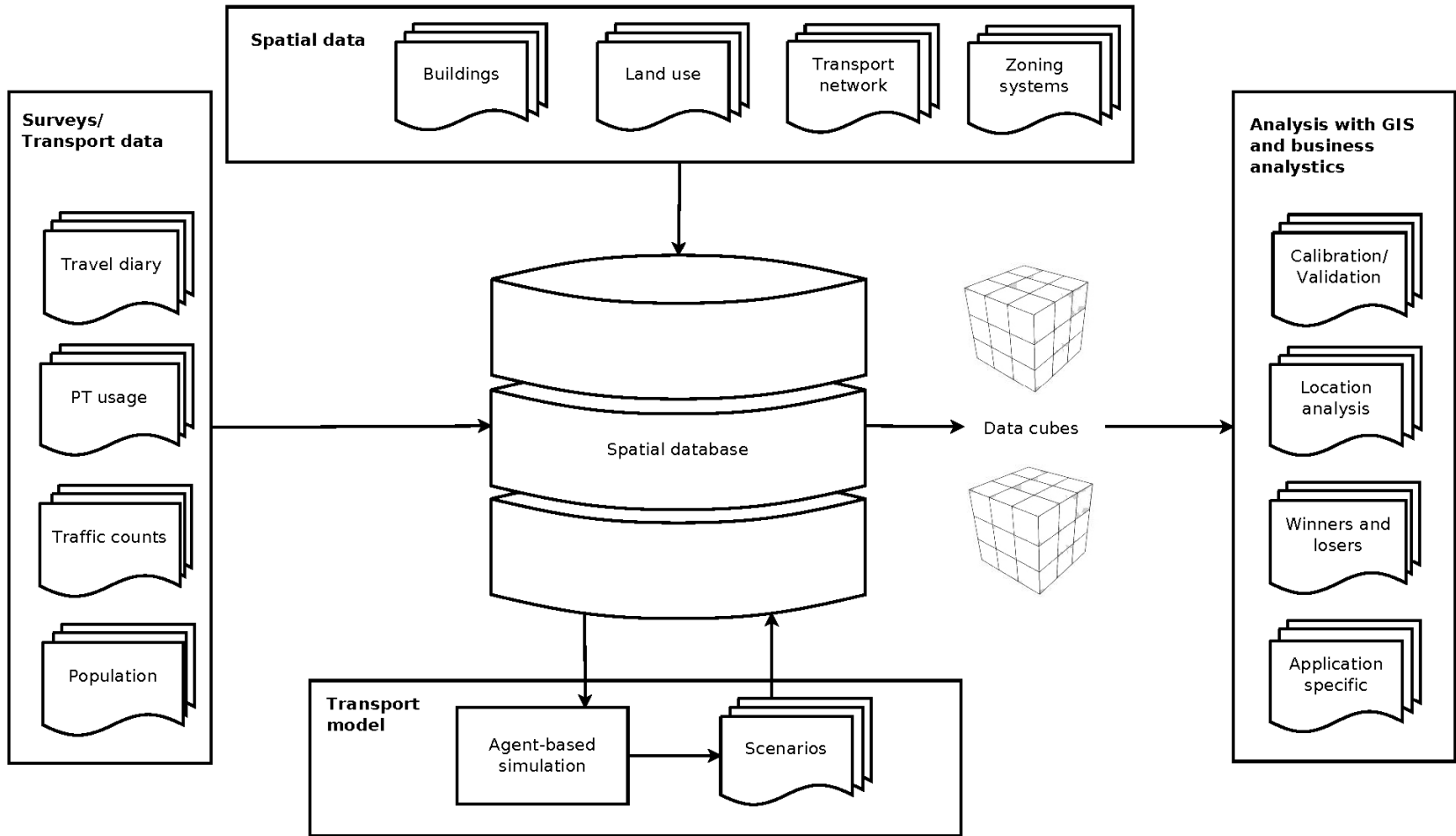
Temporal analysis

- Full temporal resolution for filtering and aggregation

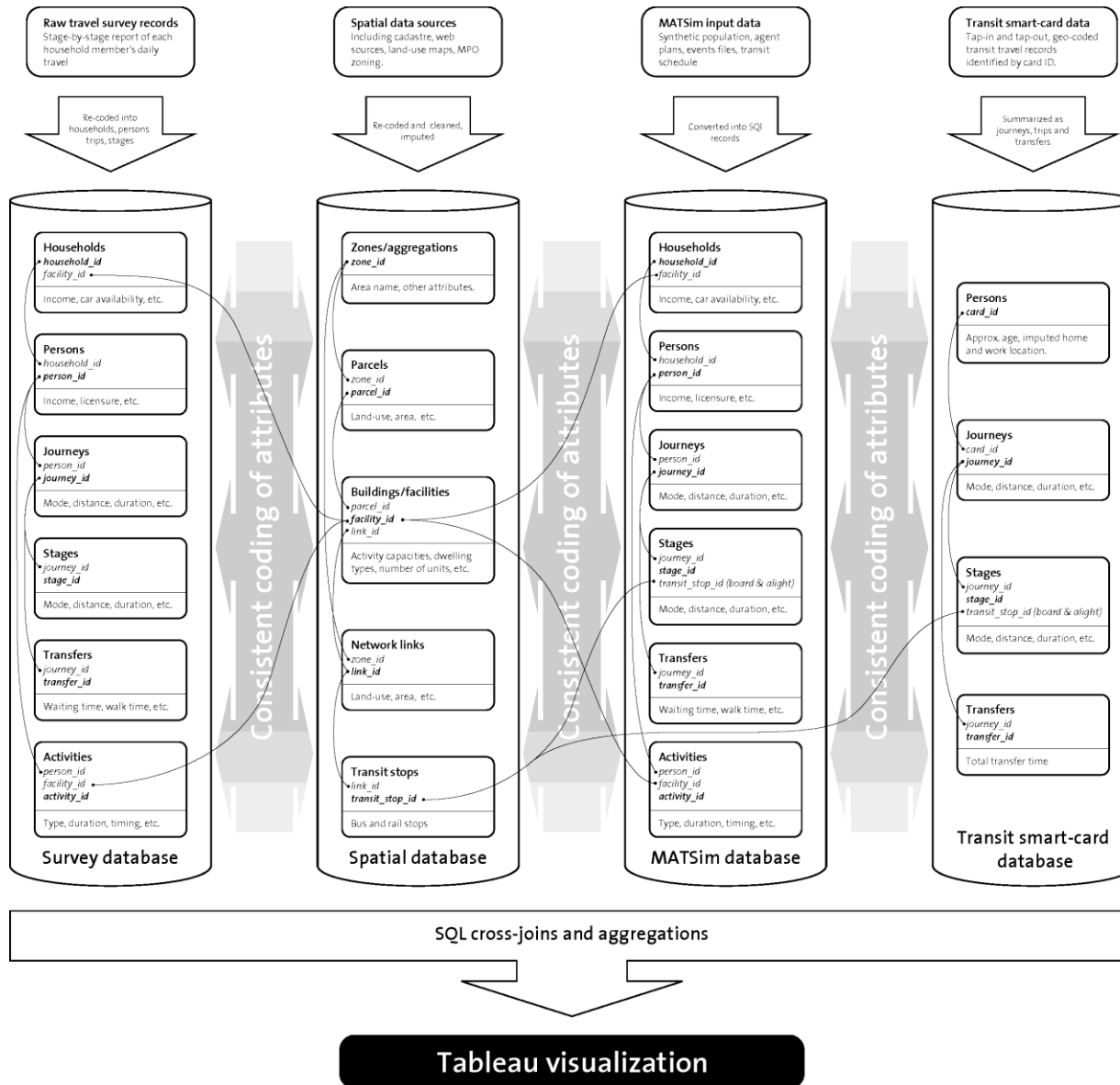
Technical requirements:

- Open source database with open interface
- Spatial queries
- Interactive front-end for analysis and visualisation

General Framework



Case study: decision support tool for Singapore



Case study applications

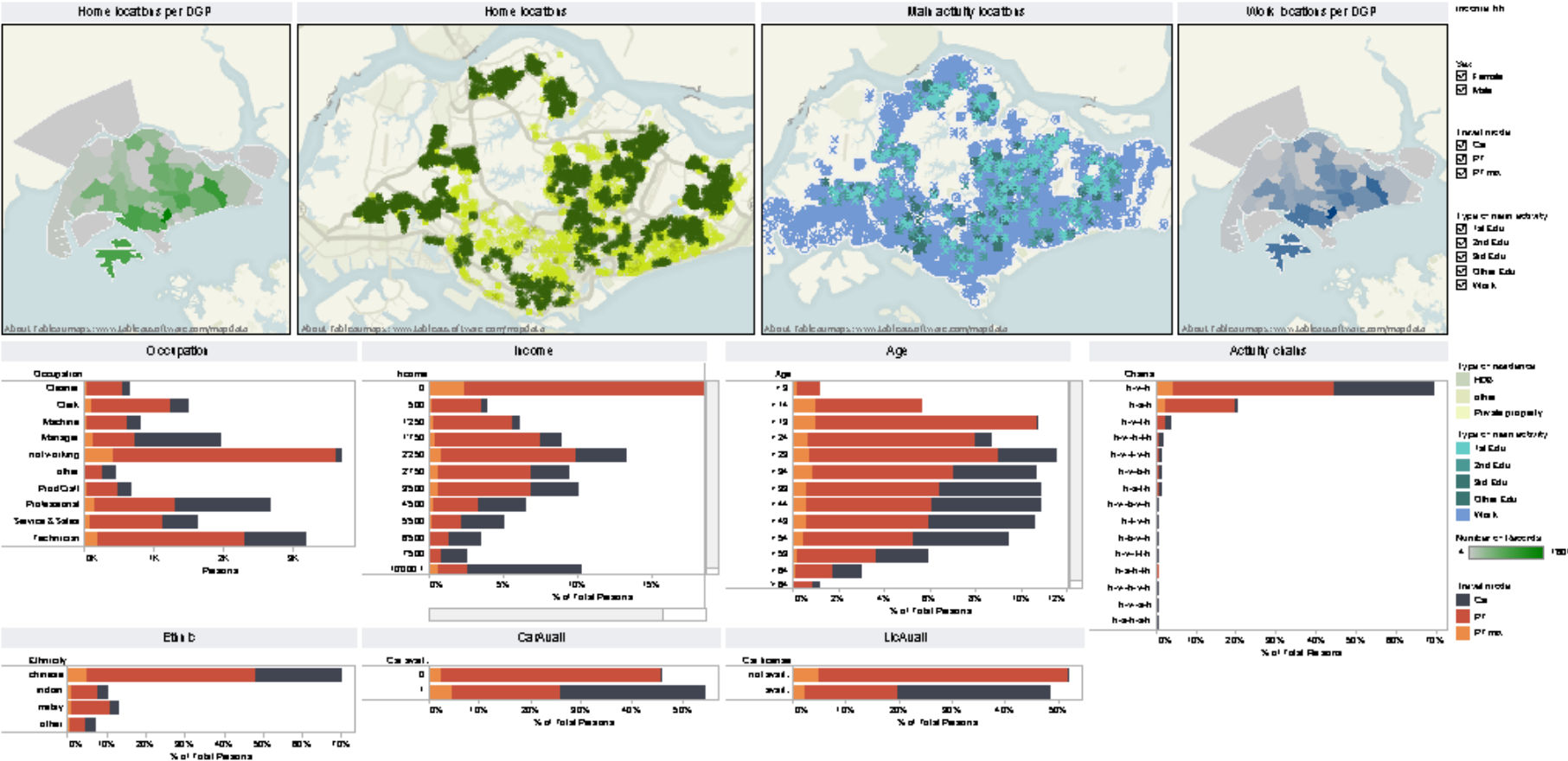
Explorative analysis of travel diary survey (or MATSim output)

- Spatial selection
- Special focus
 - Mode share
 - Commuting trips
- Socio-demographics

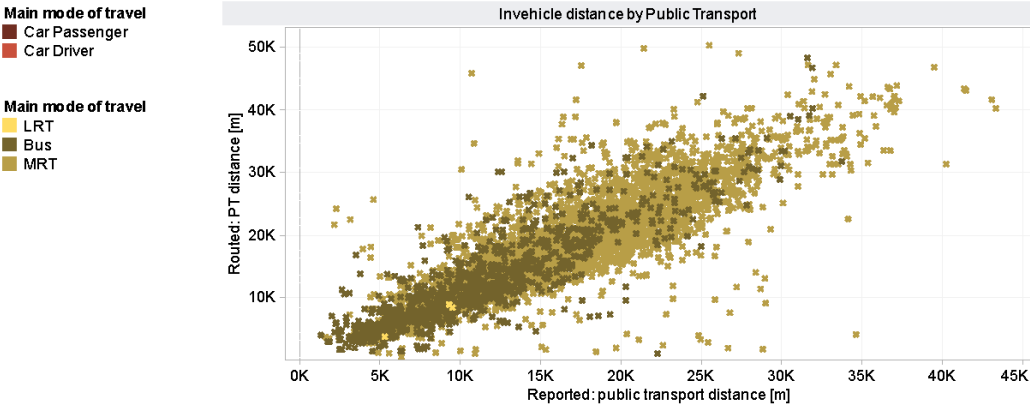
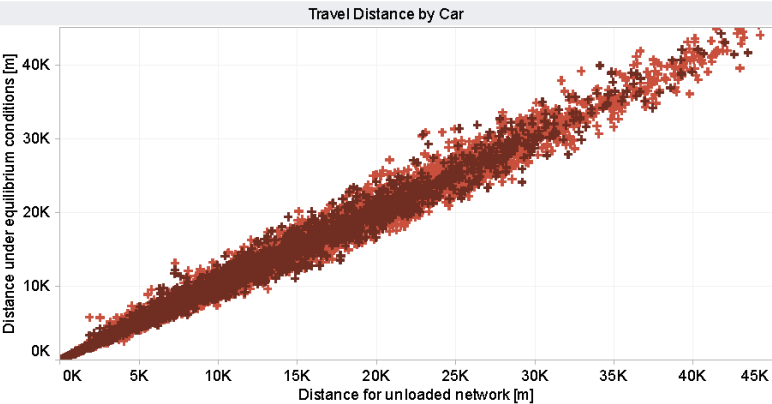
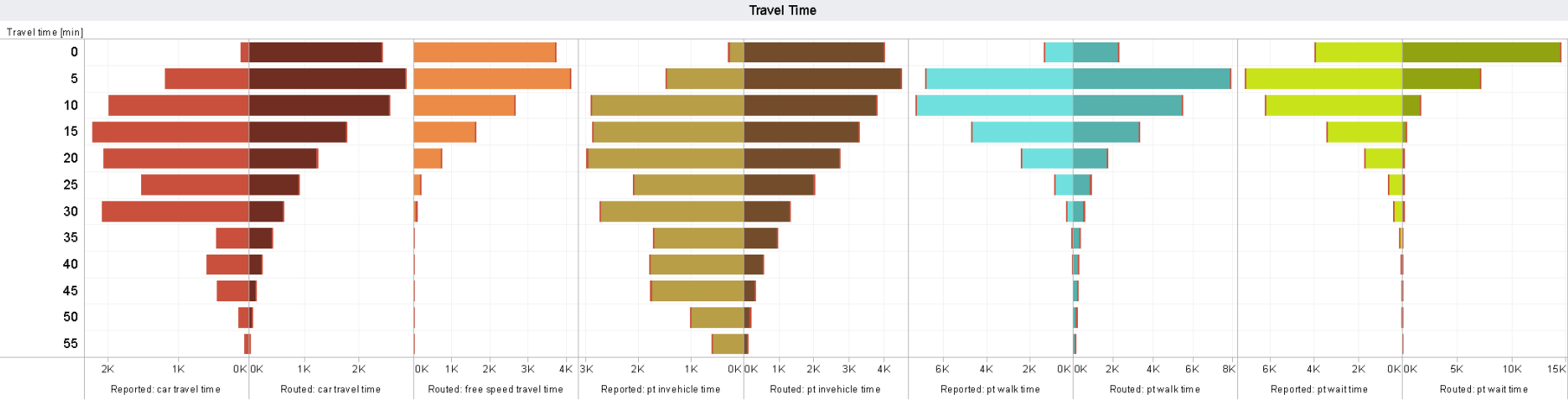
Decision cockpit for calibration

- Comparison between MATSim output and actual observations
- Pitfalls: data consistency
 - Scope of travel diary vs MATSim, e.g. pick up and drop off
 - Definition of journeys and stages PT smart card vs MATSim

Commuting trips data explorer



Travel survey: reported vs MATSim routed



Outlook

Decision support for calibration of MATSim Singapore

Engagement with transport planners in practice

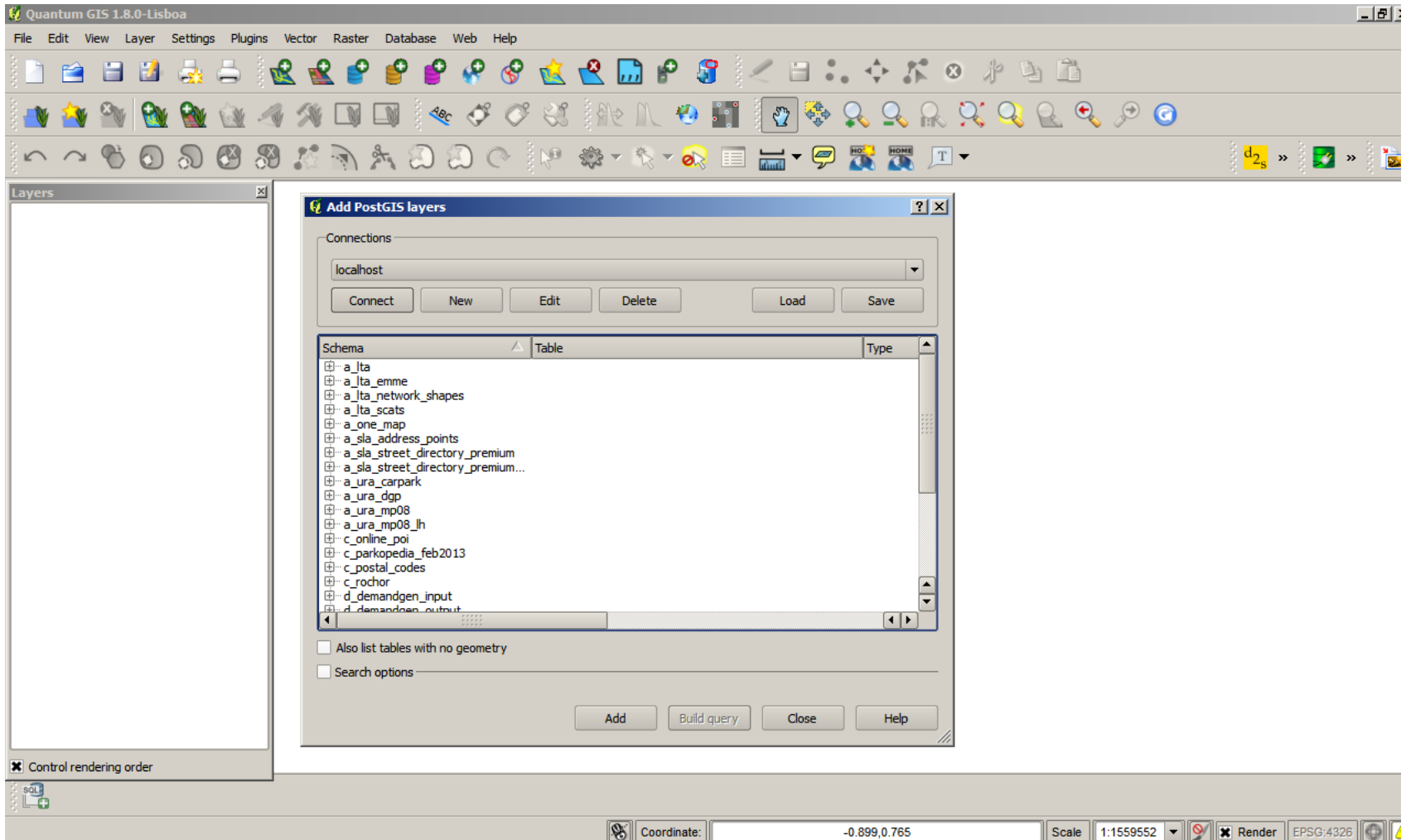
- Explorative analysis of travel diary survey
- Monitoring of bus operations based on pt smart card data
- Making MATSim results accessible

Vision:

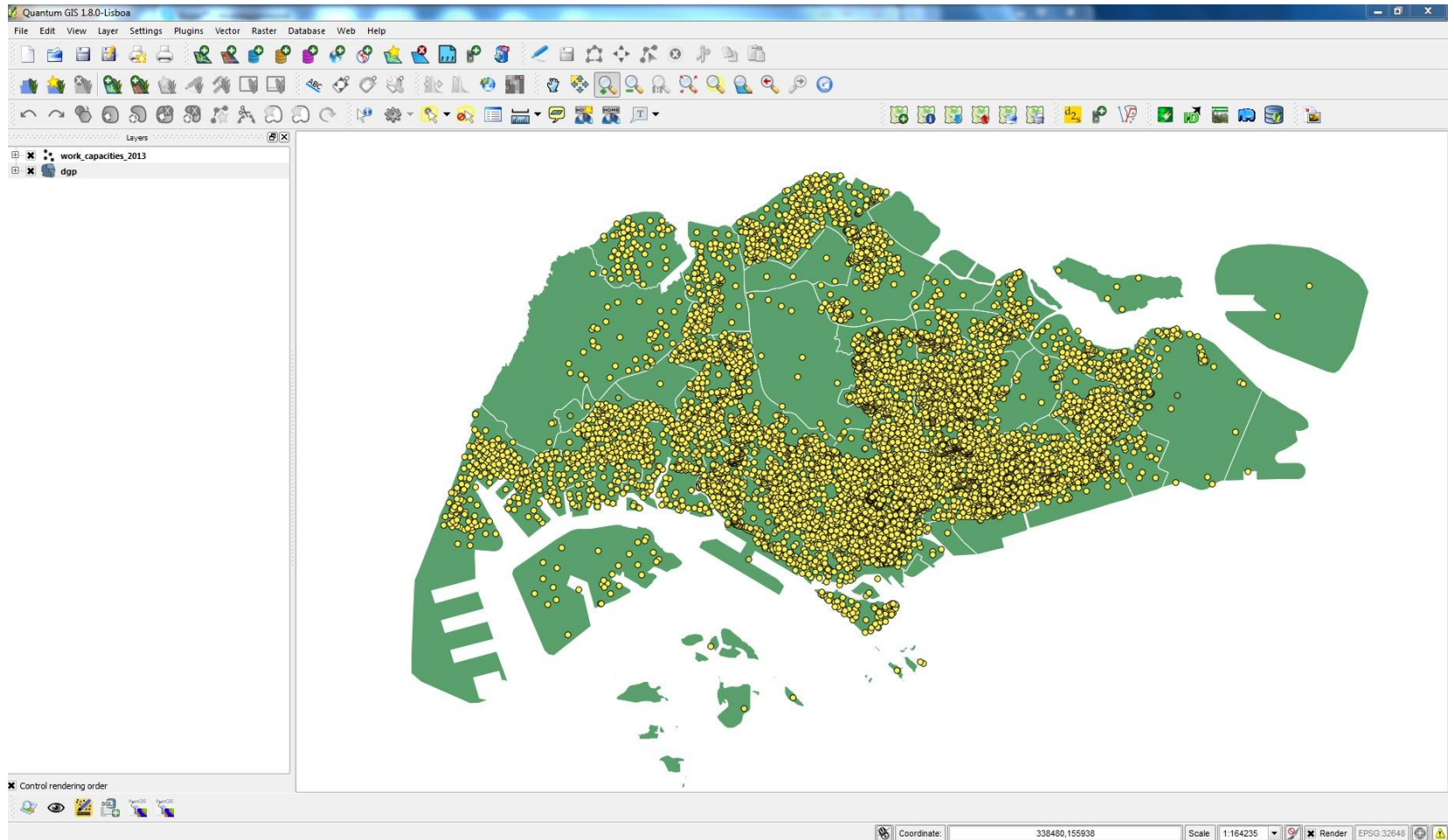
- Continuously updated data input
- Living (3d) city model to be maintain and shared data across stakeholders
- Automatic generation of MATSim 'live' scenarios
- 3d city model

Appendix

Connect and edit spatial database with Quantum GIS



Connect and edit spatial database with Quantum GIS



How do other disciplines deal with the problem?

1960: First Management Information Systems

- Interactive analysis
- Single decision maker

1970: Computer Based Systems to aid decision making

- Databases and models
- Financial planning

1980: Decision Support Systems (DSS)

- Data -> Model -> management software for end user
- Cognitive psychology and operations research join the club

How do other disciplines deal with the problem?

1990: Group decision support system

- Various stakeholders with different agendas

2000: Business intelligence

- Procter&Gamble links retailers scanner data to DSS
- On-Line Analytical Processing (OLAP) for interactive analysis
- Linkage of various data sources, e.g. from different departments

2010: Visualisation

- Analyst circumvents data warehouse specialists
- External, interactive visualisation tools
- State-of-the-Arte visualisation principles