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IDEAS THAT WORK

8-9 October 2015 | CSIR ICC



Integrated land-use and transport modelling
using OTP to determine lowest cost trips

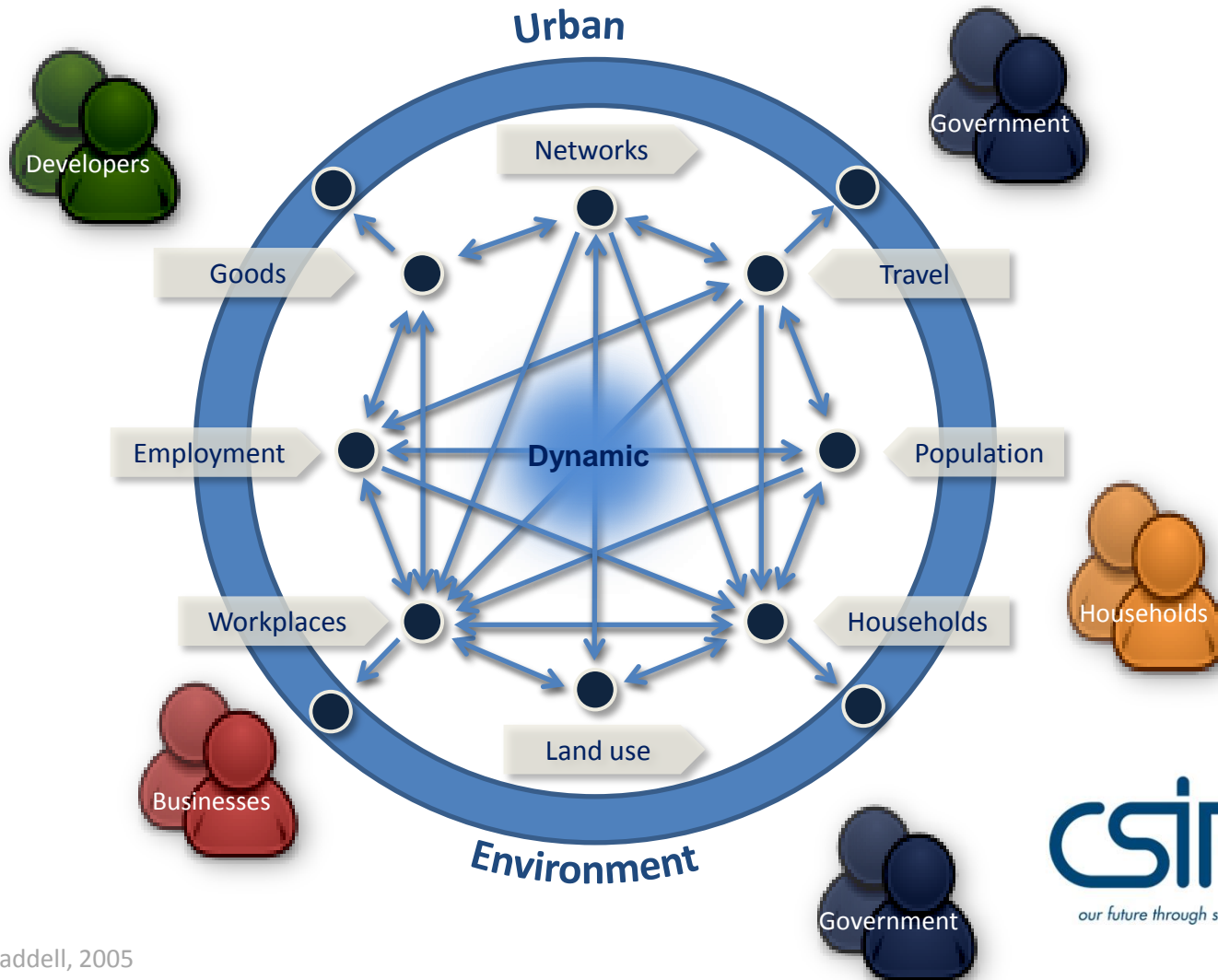
Presenter: Quintin van Heerden
Co-author: Dr Louis Waldeck

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Cities are complex

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Adapted from Waddell, 2005

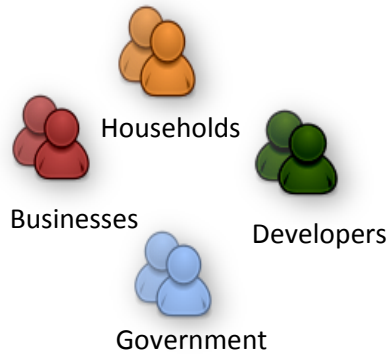
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Overview

Decision makers

Private sector
Public sector
Policies



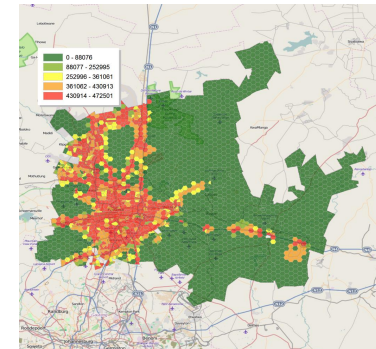
Modelling

Transport
Urban growth
OpenTripPlanner
UrbanSim
SA circumstances

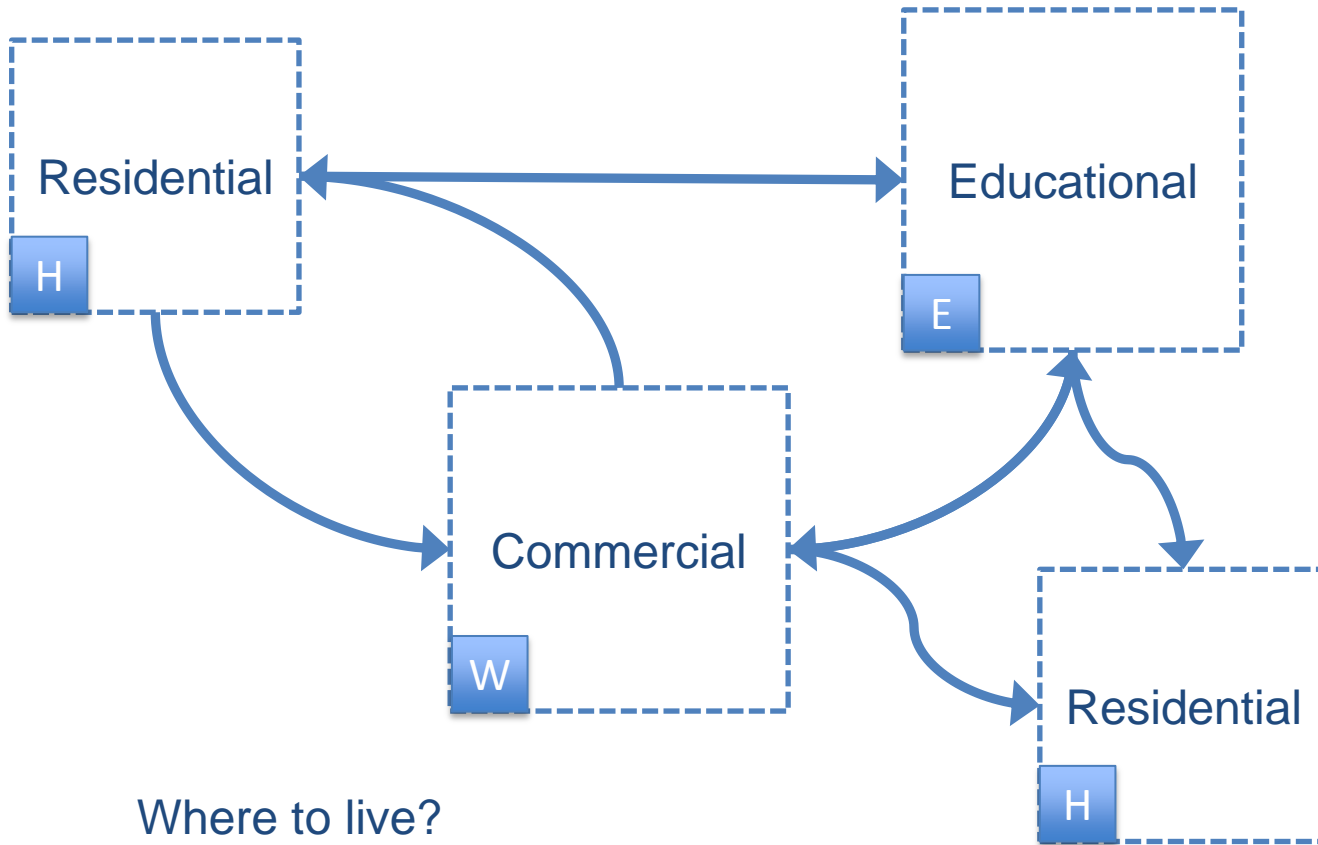


Results

Accessibility



Household choices



- H** Home activity
- E** Education activity
- W** Work activity
- Transport legs

Where to live?

Where to work or study?

Which mode of transport to use?

Infrastructure investment choices

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Economic infrastructure

Transport infrastructure

Energy systems

Economic competitiveness

Social infrastructure

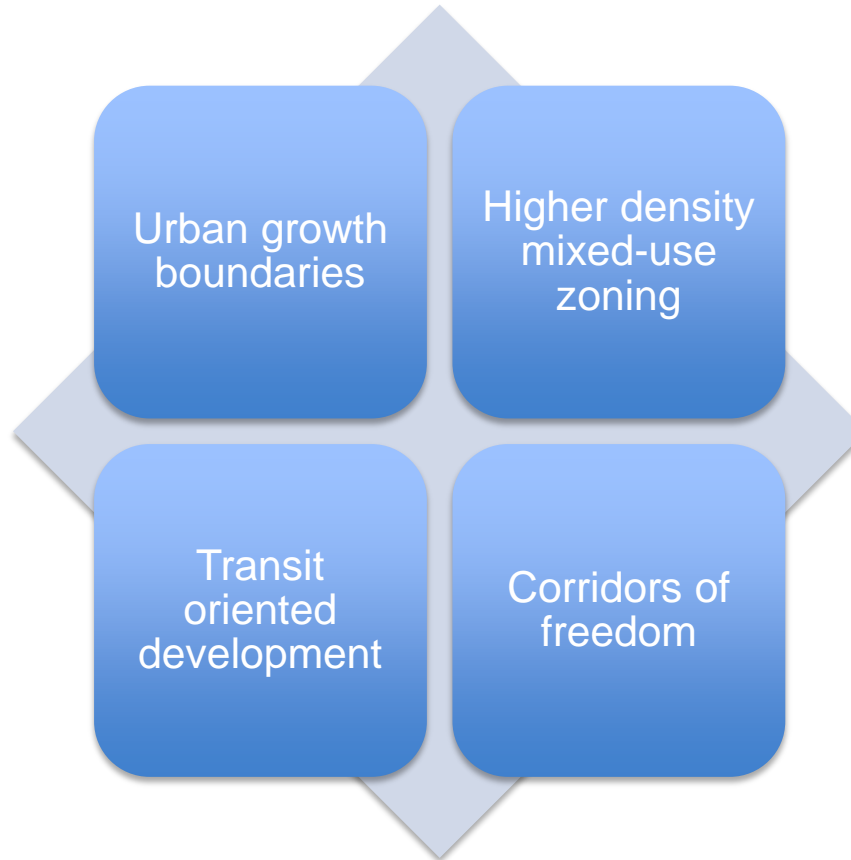
Basic necessities

Grants/subsidies

Social well-being

Policy evaluation

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How do we translate this to the modelling environment?

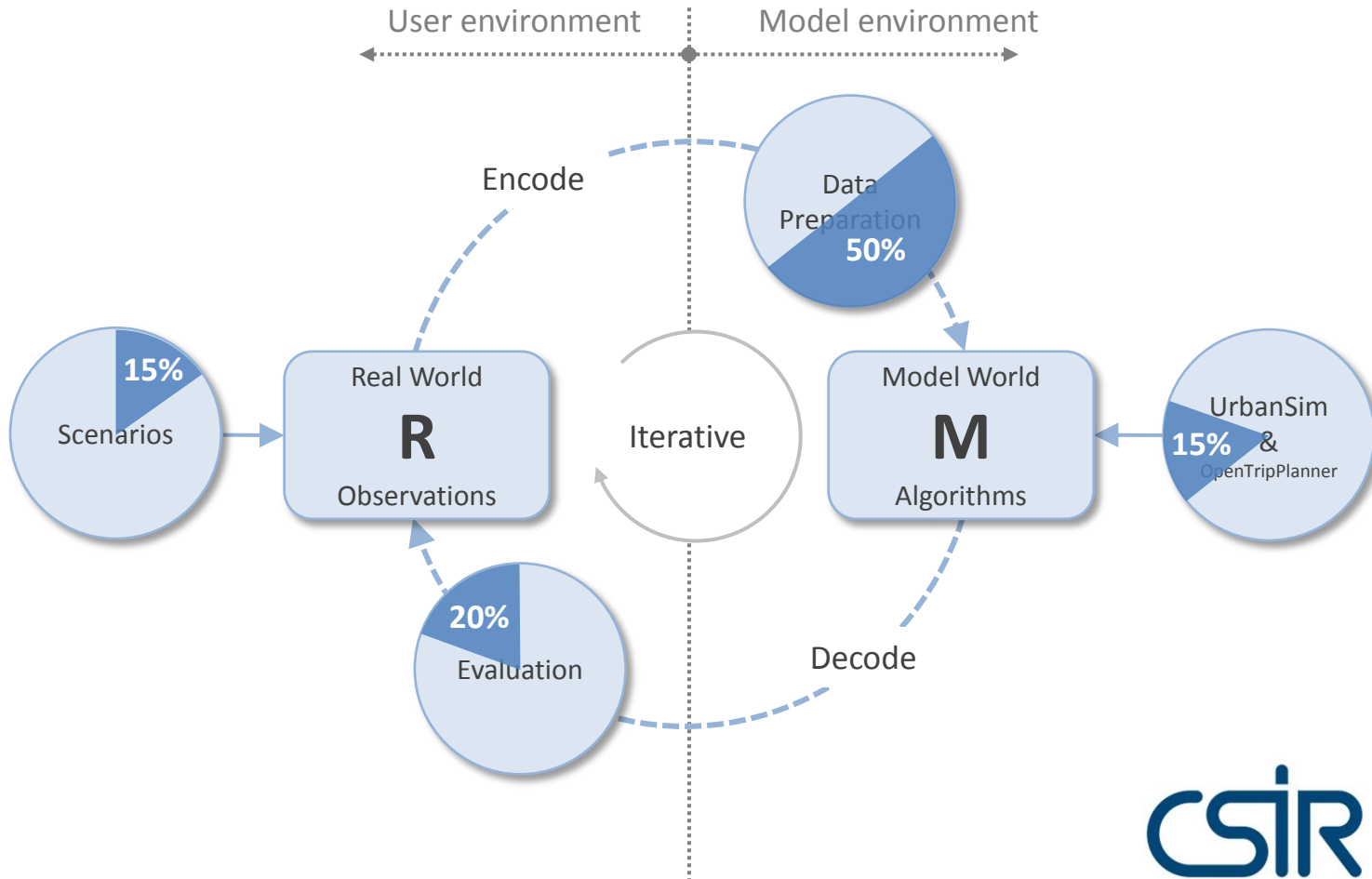
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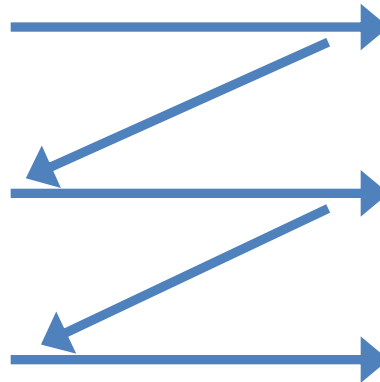


*Based on Casti, 1994

Modelling paradigms

Transport models

- Household forecasts
- Aggregate flows
- Micro/Agent-based
- Steady state/equilibrium
- Policy evaluation



Urban models

- Travel time forecasts
- Urban growth forecasts
- Services requirements
- Policy evaluation

Chicken and egg paradox

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I just ordered a **chicken** and
an **egg** on the internet to
see which one arrives **first**...

Modelling paradigms

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Transport models

- Household forecasts
- Aggregate flows
- Micro/Agent-based simulation
- Steady state/equilibrium
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Urban models

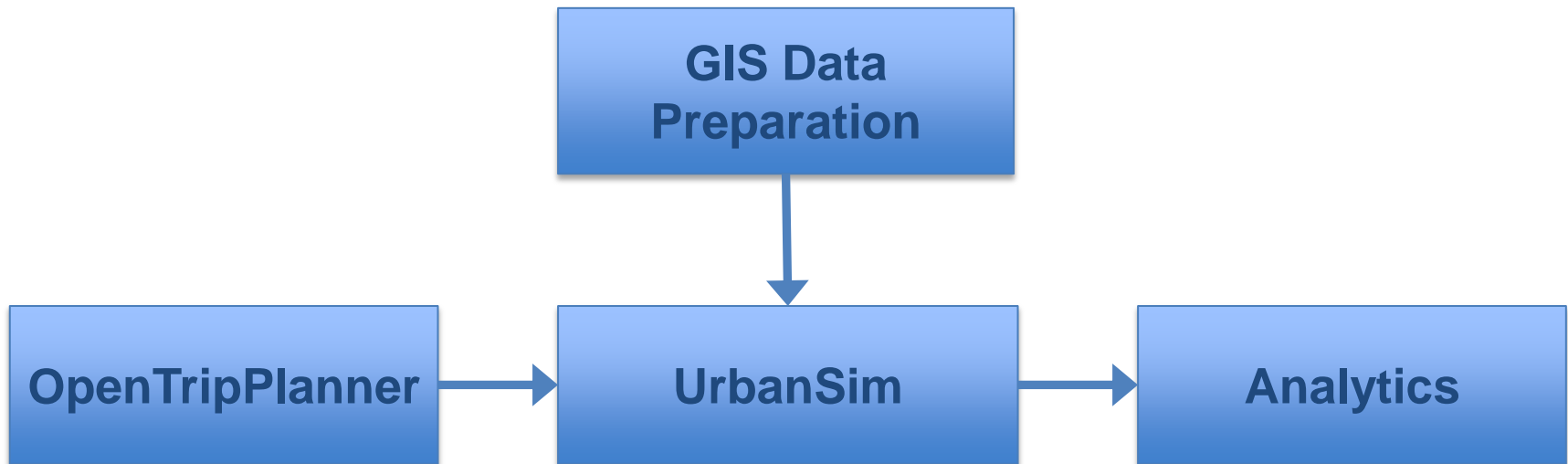
- Travel time forecasts
- Urban growth forecasts
- Services requirements
- Policy evaluation



Land-use Transport Interaction/Integration

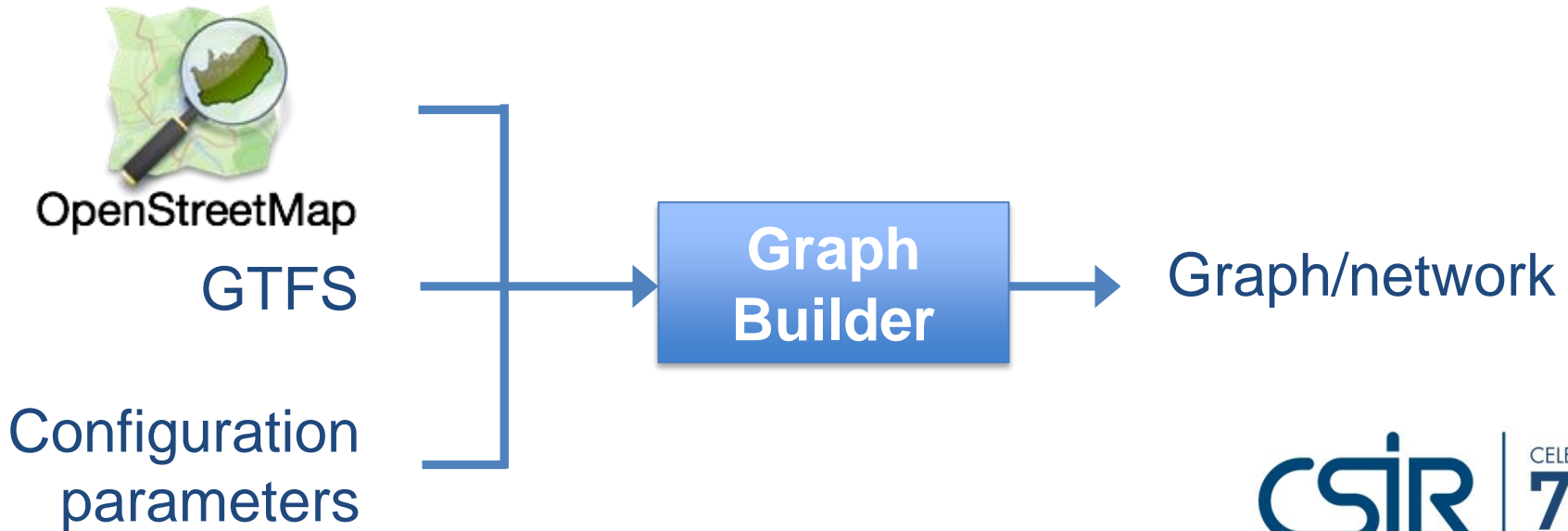
(LUTI)

Modelling procedure



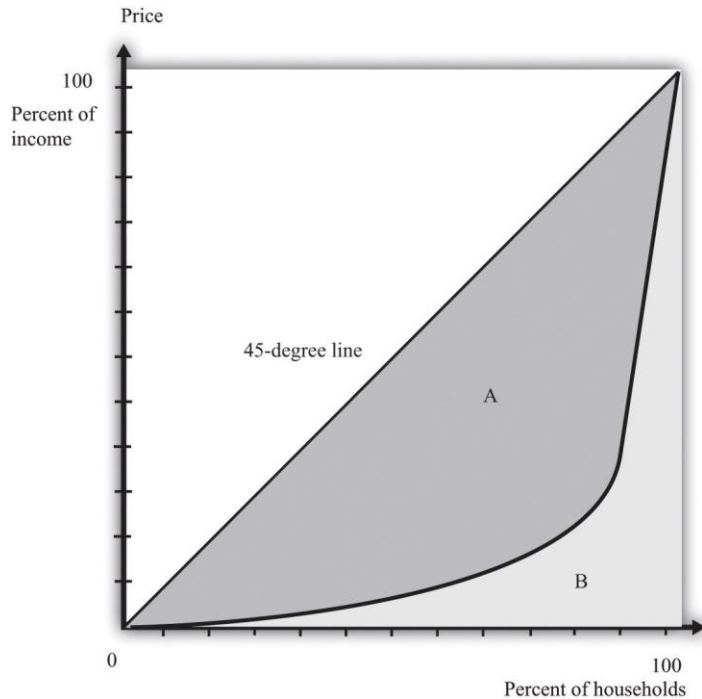
OpenTripPlanner

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Unique circumstances in SA

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“ We are all equal,
but some are
more equal
than others... ”

*SA has Gini Coefficient of +/- 0.59
(0.65 in 2011 – World Bank)

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Unique circumstances in SA

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85% of households earn **less than R9 600** per month with a **median income of ~ R3300** per month

20% walk to work

hence people are more **sensitive** to **monetary cost** than travel time

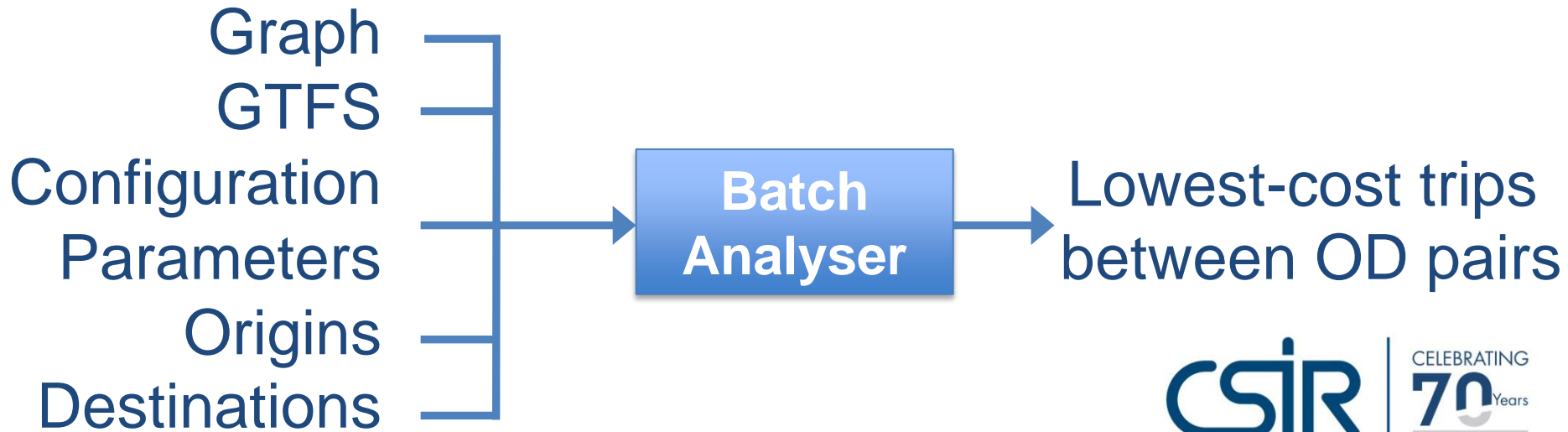
40% rely on **public transport**, spending a **disproportionate amount of income on transportation**

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From a variety of data sources:

Control Totals

Households by income, age, children, cars ...
Employment by Standard Industry Classification

STATSSA

Synthetic population

From 10% sample of enumerator forms from census
and control totals for sub places and main places

STATSSA

Land and buildings

Property boundaries (~2 300 000)
Classify by typology of ~50 classes derived from
Knowledge Factory
Type of building and market value

Transportation

Road network from OpenStreetMap
Rail, bus & taxi routes/stops

Other

Environmentally sensitive, undermined, dolomitic areas ...
Developments in the pipeline ...

Study area

Previously: Metro boundaries.
Currently: Whole Gauteng.



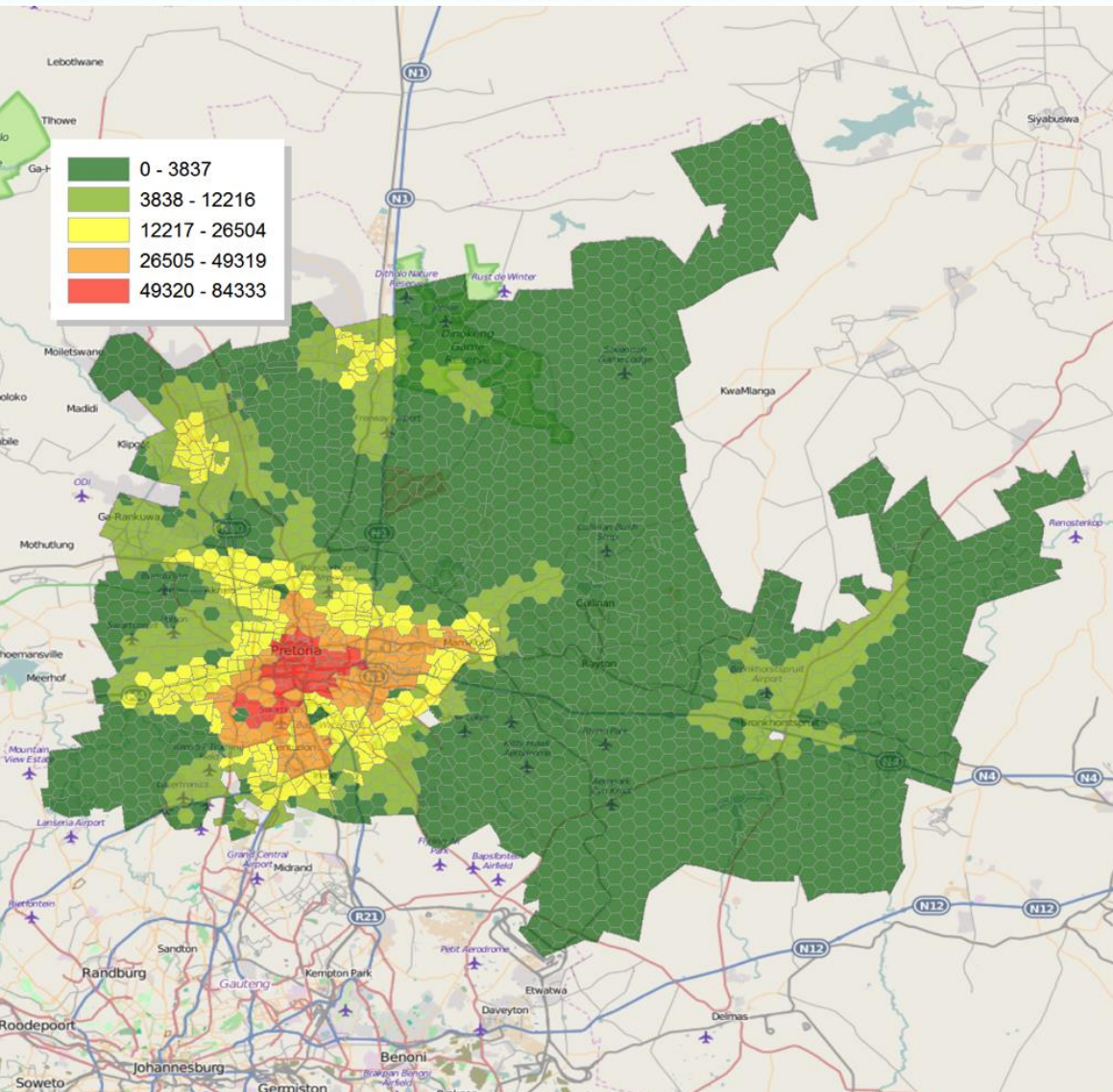
Results

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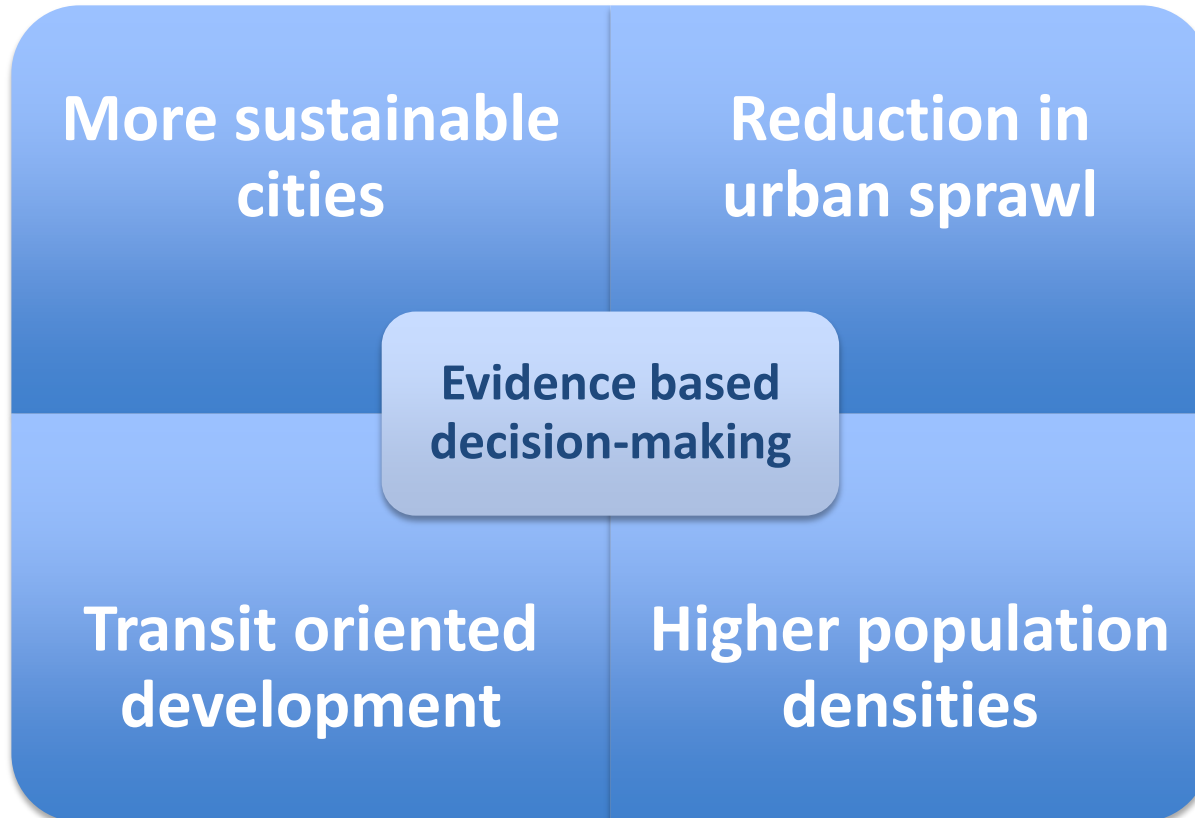
Private car only



Jobs reached
under R40/day

Putting it into perspective

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