BIG DATA IN THE CITIES OF TODAY AND TOMORROW

THE CHELMSFORD (ESSEX –UK) CASE STUDY

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CYPRIOT SCIENTISTS AND ENGINEERS

AGENDA

- Big Data
- Transport Models
- Case study of Chelmsford
- Future models and usage of big data

QUESTION TIME

- **Can you please raise your hand if you have ever heard about big data?**

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- **Can you please raise your hand if you know the definition of big data?**

QUESTION TIME

- Can you please raise your hand if you have ever heard about big data?
- Can you please raise your hand if you know the definition of big data?
- **Can you please raise your hand if you believe you have worked with or you are working with big data?**

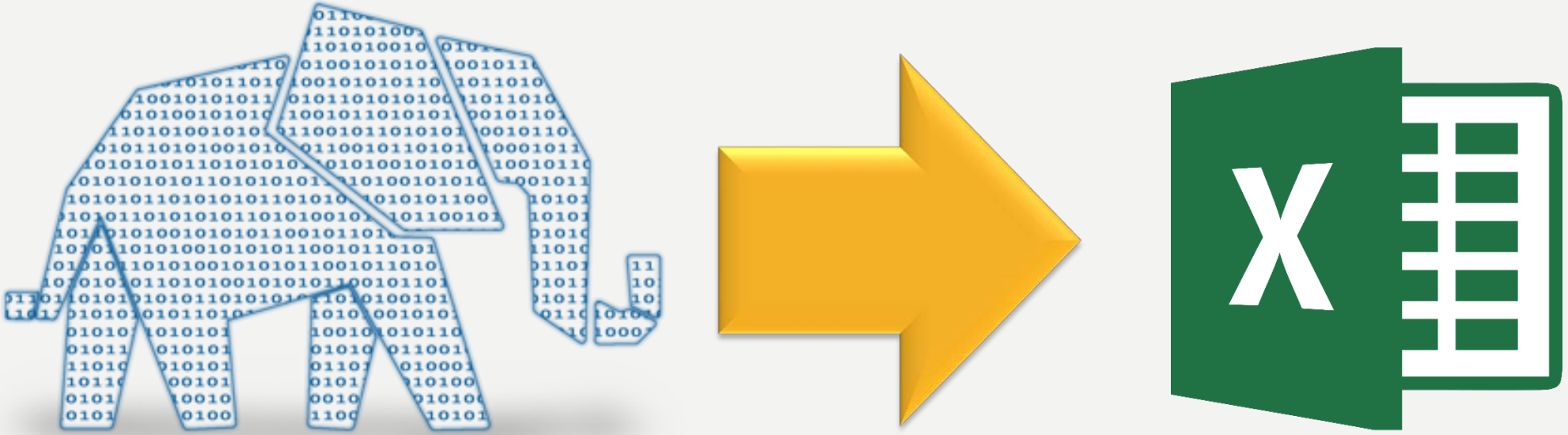
BIG DATA IS LIKE, TEENAGE SEX

- Everyone heard about it,
- Nobody really knows how to do it,
- Everyone thinks everyone else is doing it,
- So everyone claims they are doing it.

DAN ARIELY, DUKE UNIVERSITY

WHAT IS BIG DATA?

Big data is whatever **doesn't fit** into **Excel** (?)



WHAT IS BIG DATA?

Every day, we create **2.5 QUINTILLION** bytes of data

2,500,000,000,000,000 bytes = 2.5 petabytes

(equivalent of 33.3 years of HD video content)

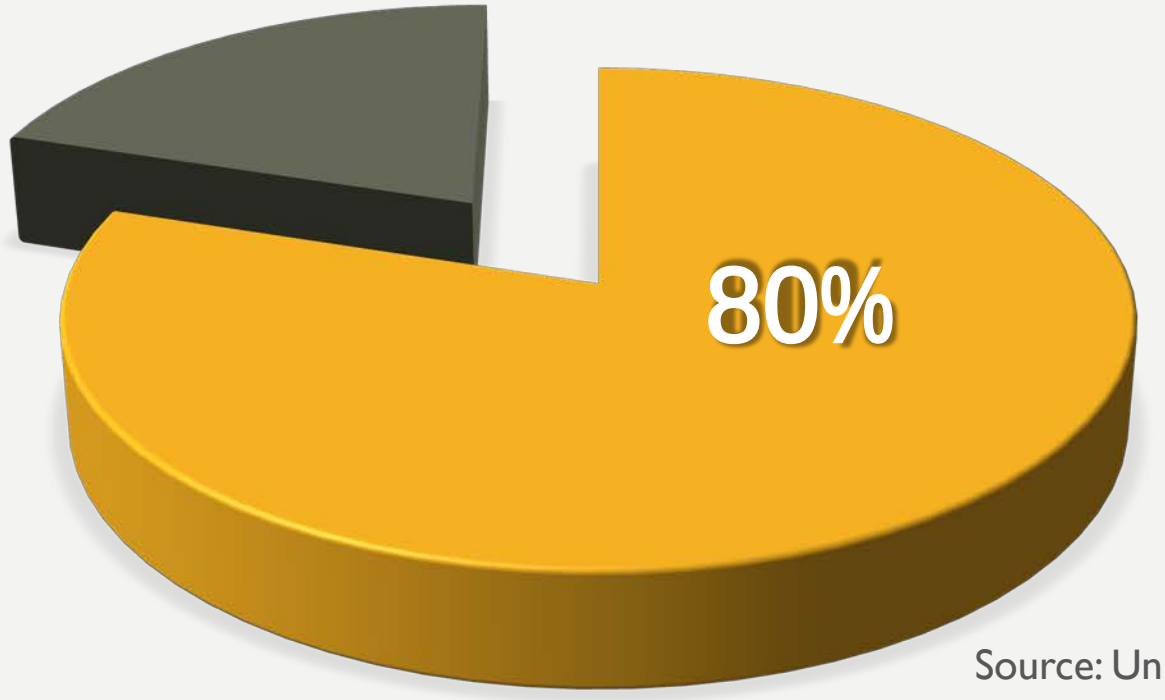
90% of the data in the world today **has been created in the last two years** alone

Data comes from **EVERYWHERE**

- sensors used to gather climate information
- posts to social media sites
- digital pictures and videos,
- purchase transaction records,
- cell phone GPS signals
- Mobile apps
- Music
- …

IBM (2017)

SPATIAL COMPONENT ON DATA

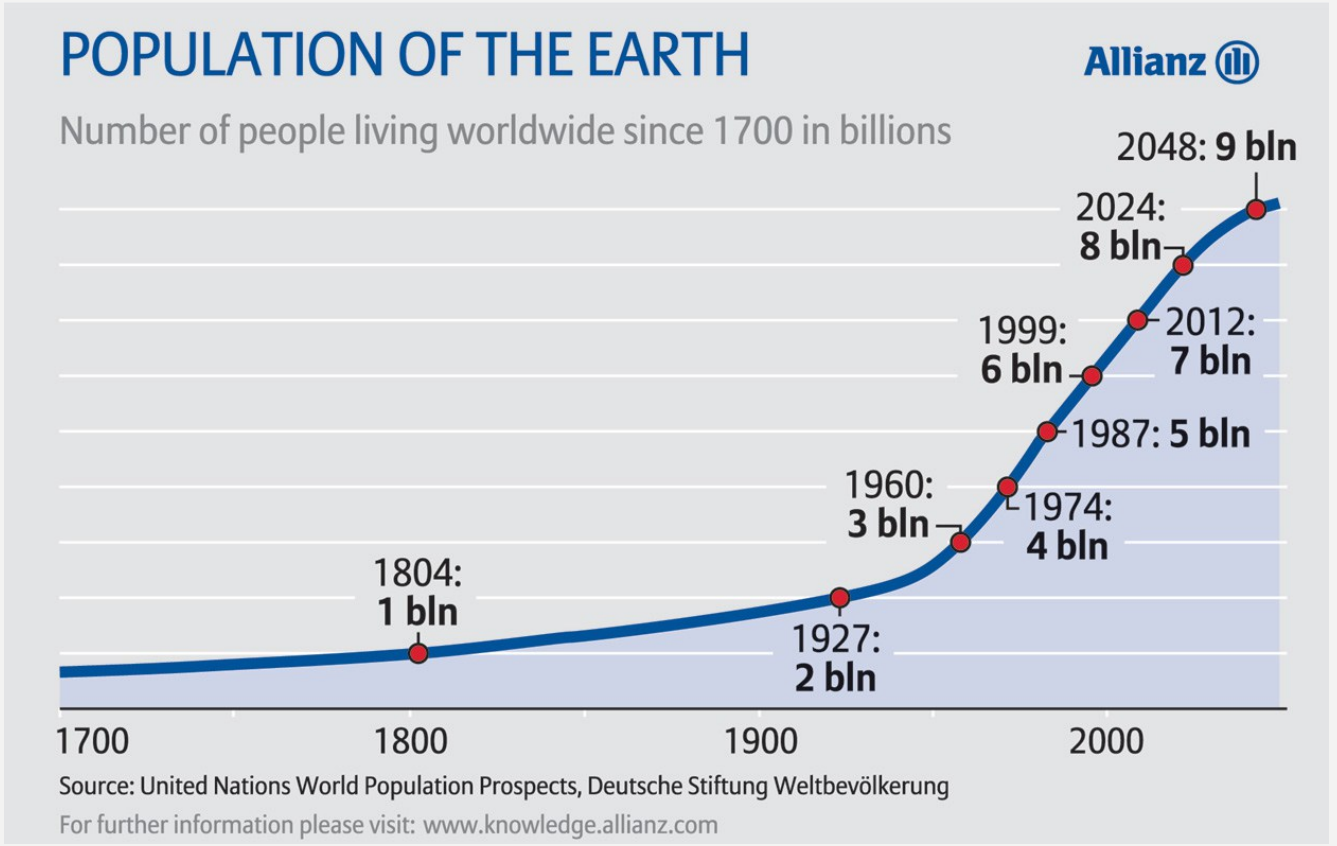


Source: Unknown

Almost everything that happens, happens somewhere. Knowing where something happens can be critically important" Paul Longley, 2015

POPULATION GROWTH CHALLENGES

- Health Care
- Over-populated schools
- Housing crisis – increase of housing prices
- Transport – worse and more frequent traffic jams
- Etc.



CAN WE REDUCE THE IMPACTS OF THESE PROBLEMS USING THE DATA WE PRODUCE?

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YES WE CAN!

Data

VEHICLE-CENTRIC DEVELOPMENT OF THE PAST DECADE

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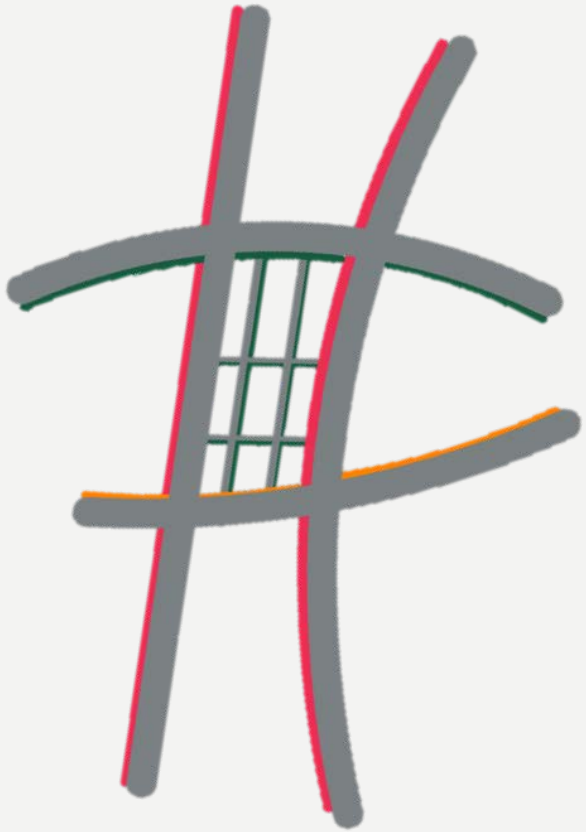
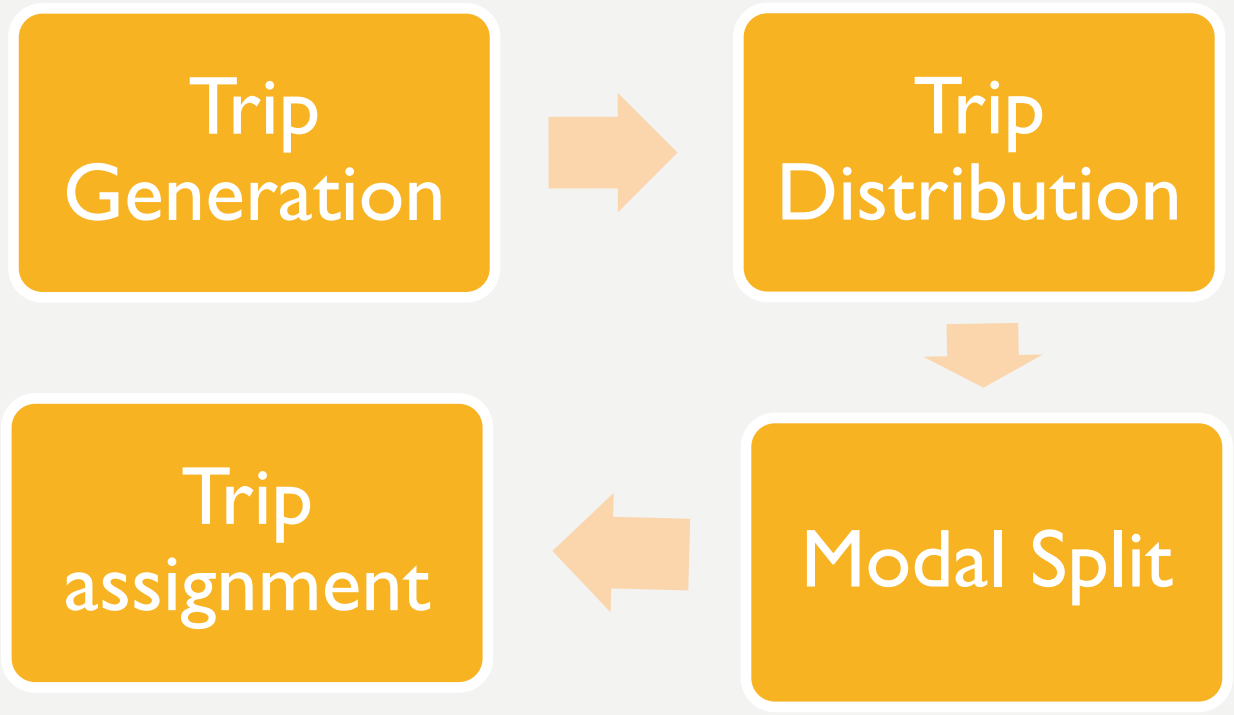
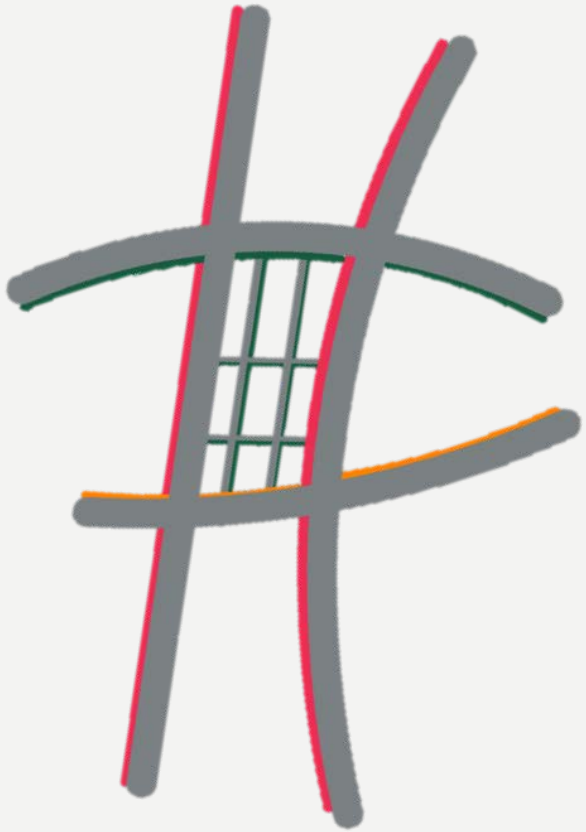
TRANSPORT MODELS

The model is built in a computer with a **representation of the transport system** and the demand from people who want to use it both **now** and in the **future**.



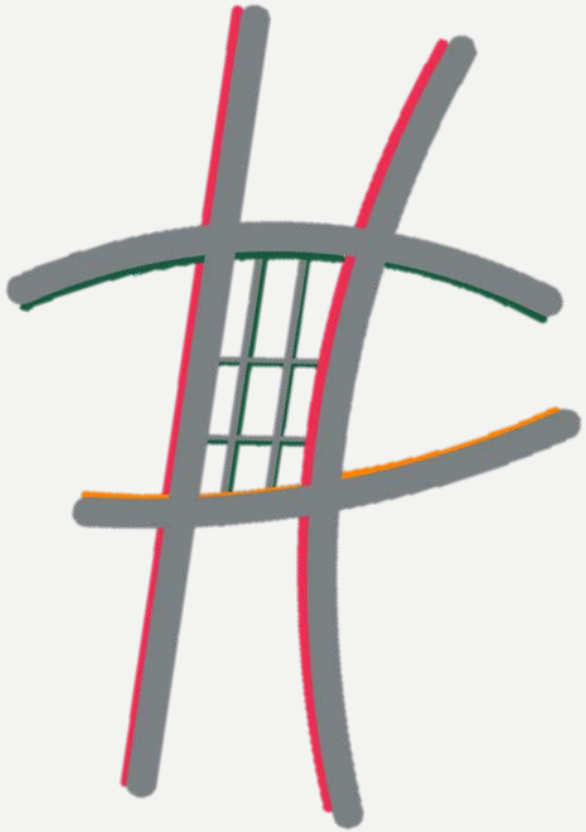
TRANSPORT MODELS





TRADITIONAL MODEL INPUTS

- Road Network
- Census
- Automatic Number Plate Recognition (ANPR)
- Traffic Counts (ATC,MCC)
- Surveys
- Other National Databases
- …



CHELMSFORD CASE STUDY

- Metropolitan area of Chelmsford (Essex) has a population of about 110 thousand (2011), which is expected to increase by about 40 thousand by 2021
- In order to facilitate future growth and successfully bid for available infrastructure funding, Essex County Council commissioned Jacobs to build a fully multi-modal model of Chelmsford Borough

JACOBS™

CHELMSFORD TRAFFIC SIMULATION MODEL

MULTIMODAL

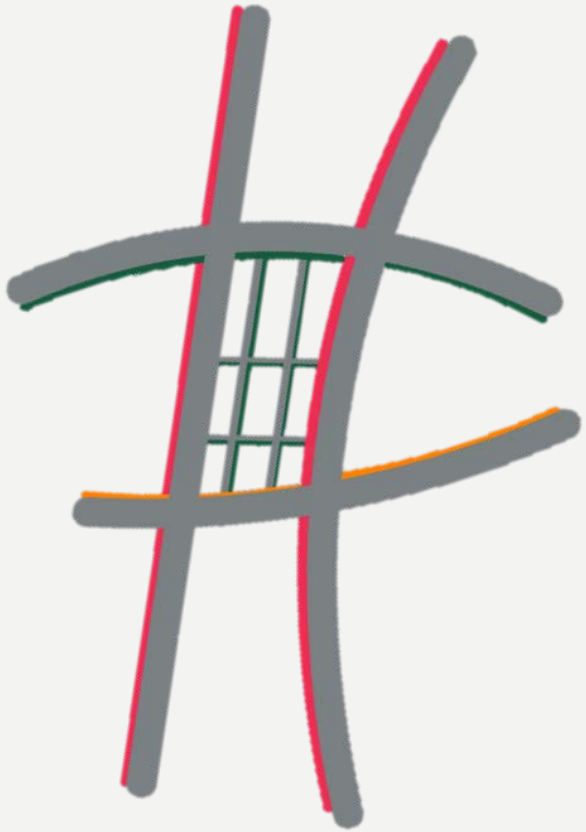
- Cars
- LGVs,
- HGVs,
- Buses,
- Rail,
- Park and Ride,
- Cycling
- Walking

MULTIPURPOSE

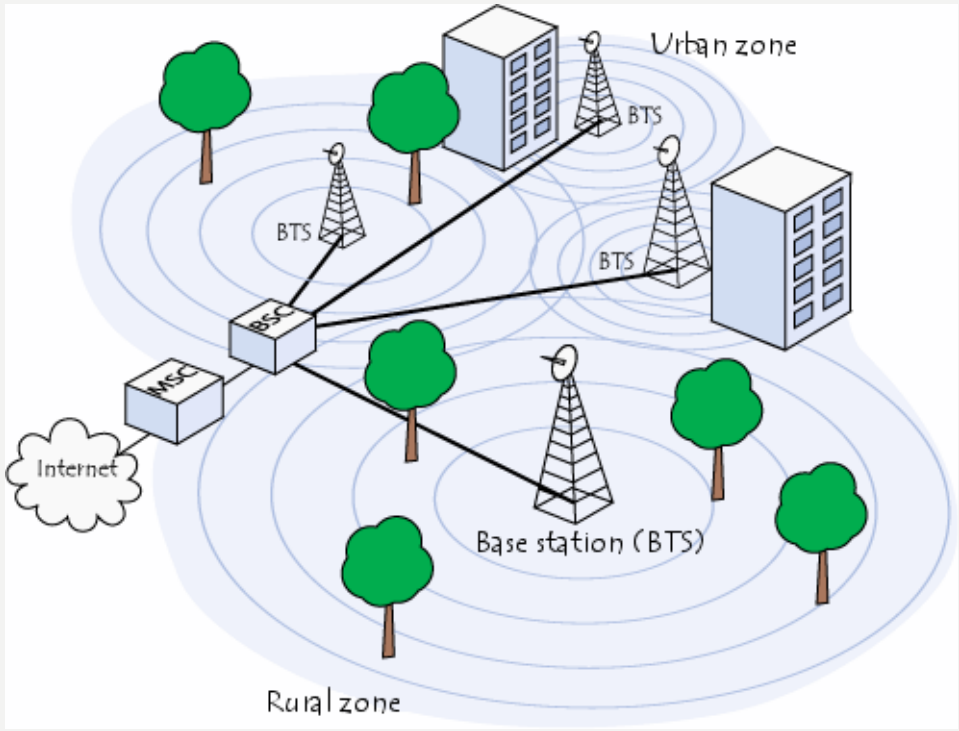
- Home to work
- Non-home base trips
- Others

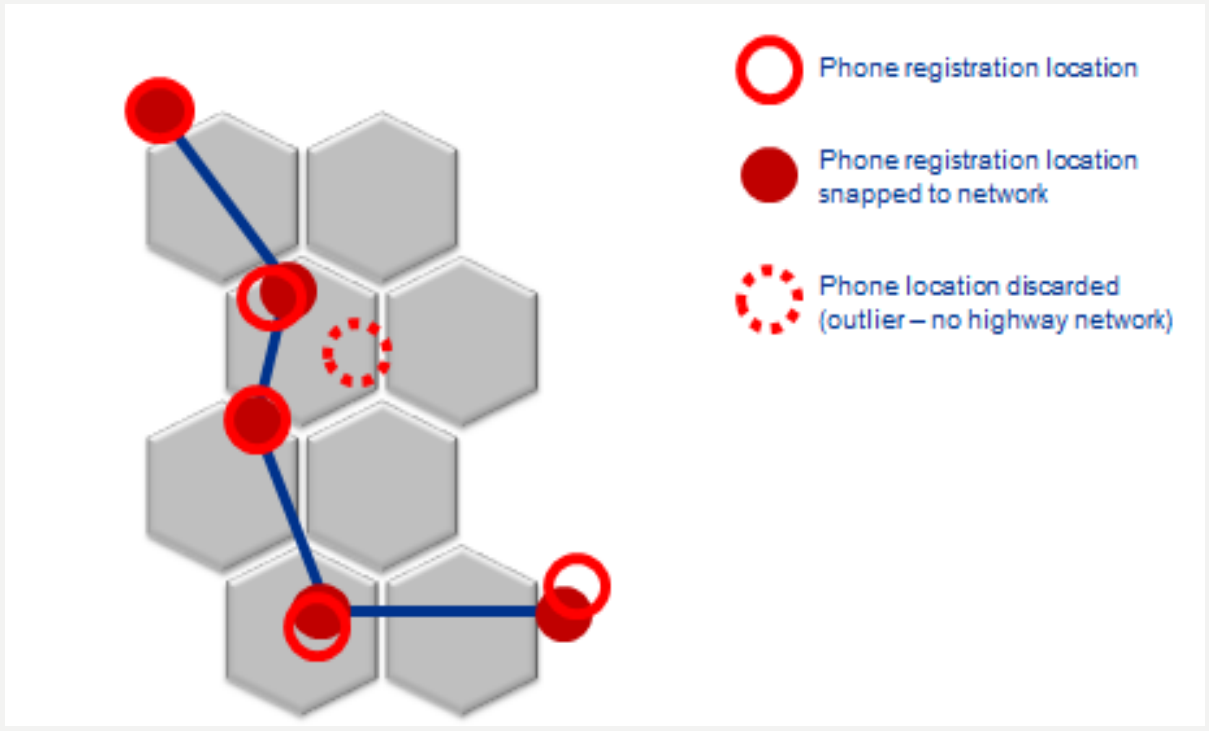
CHELMSFORD MODEL INPUTS

- Road Network
- Census
- Automatic Number Plate Recognition (ANPR)
- Traffic Counts
- Surveys
- Other National Databases
- **GPS Data from tracks**
- **GPS Data from Mobile apps**
- **Cellular Mobile Phone Data**



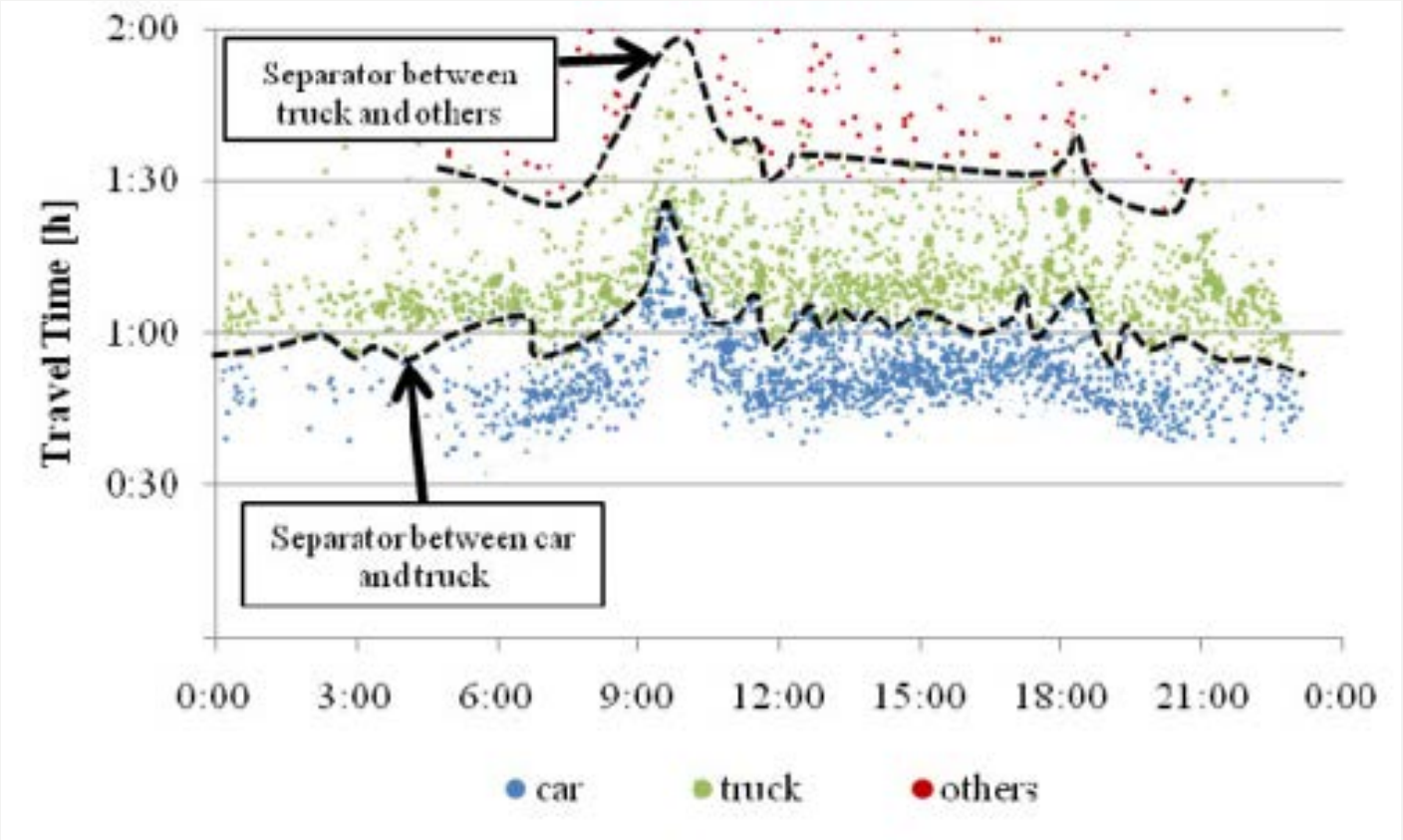
MOBILE PHONE DATA

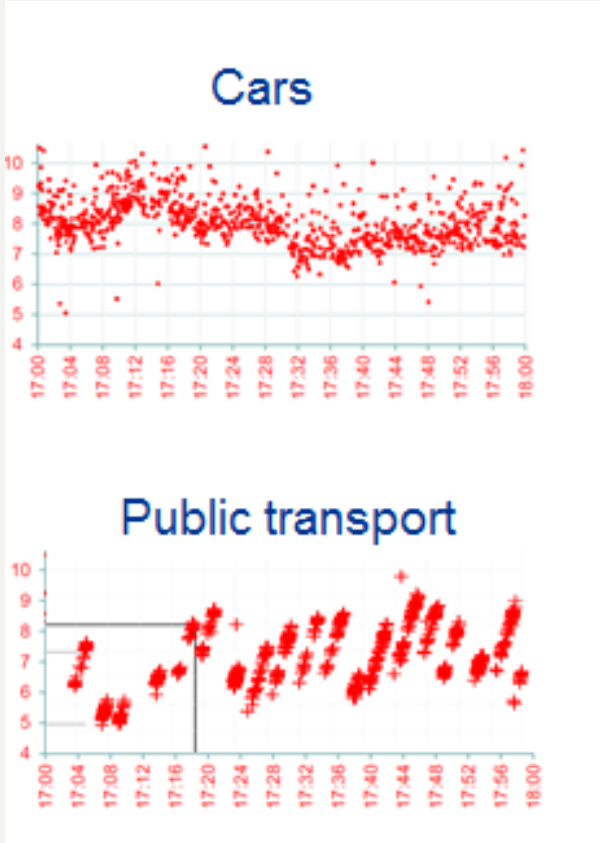




Telefónica

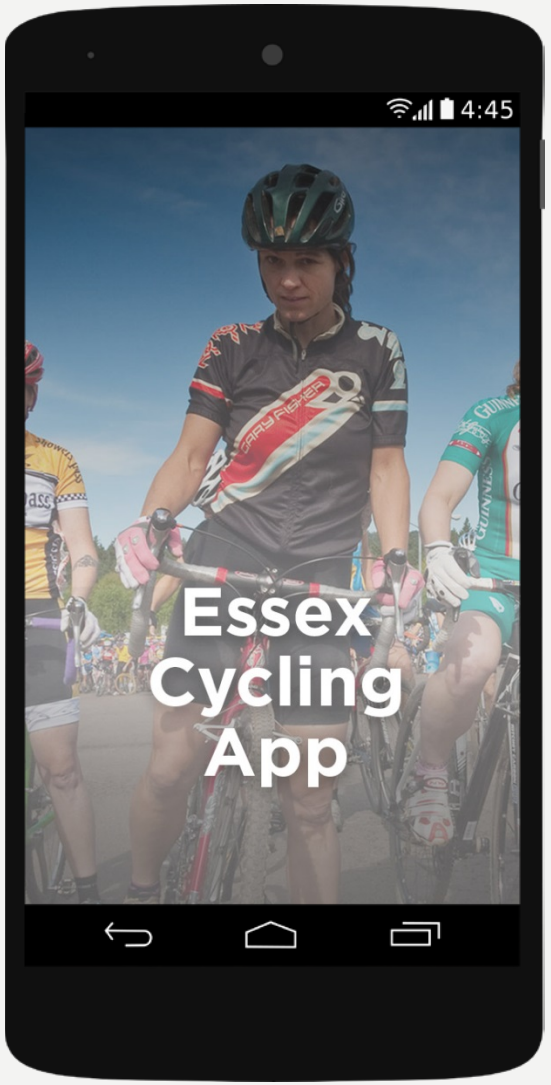
MOBILE PHONE DATA

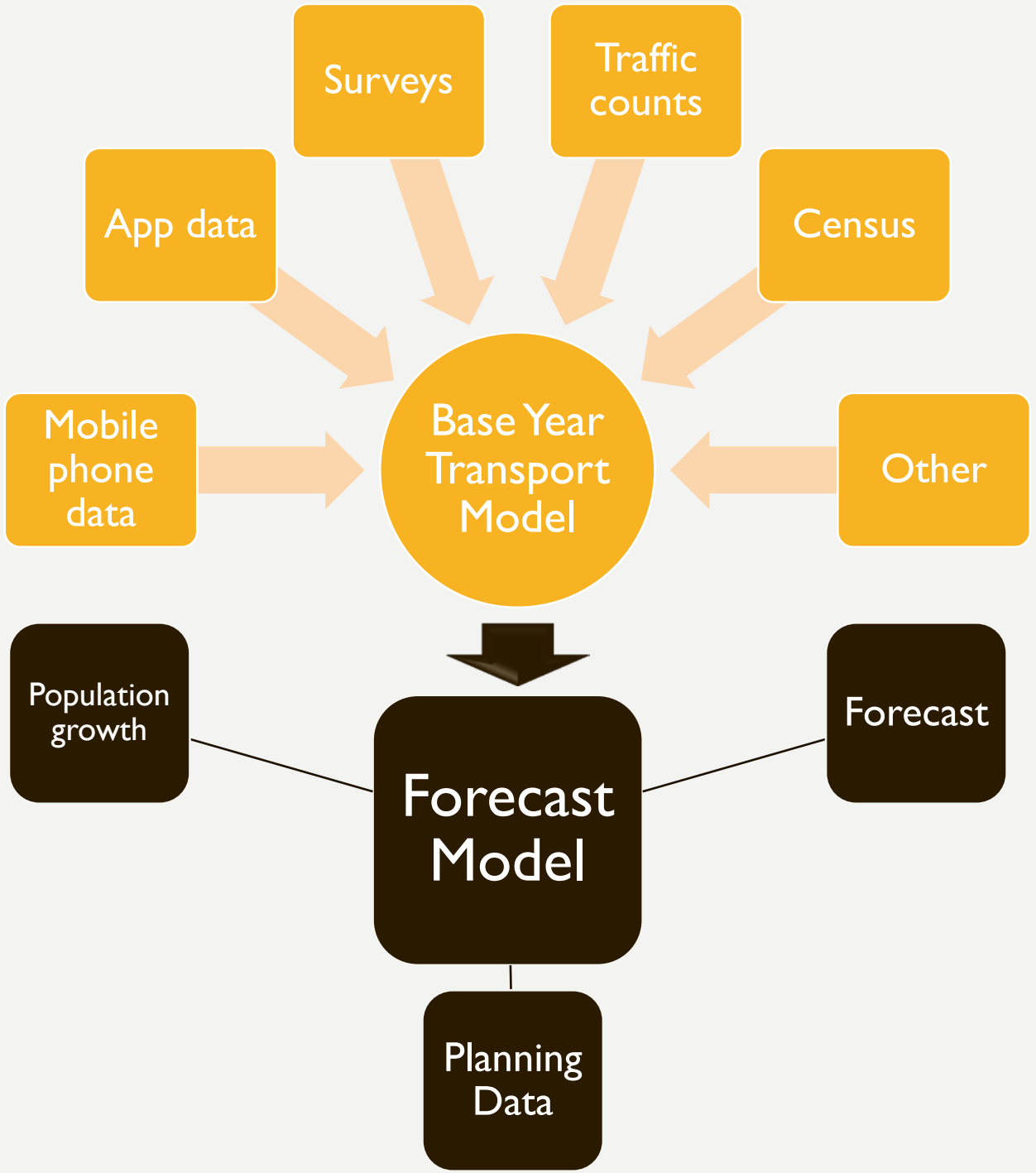




MOBILE APP DATA

- Due to the special characteristics and travel patterns that characterise cyclists and their movements, a specific mobile phone app was developed with the intention of adequately capture cyclists' data
- Data Collection
  - Origin time and location
  - Destination time and location
  - Trip purpose
  - Routes
  - Personal data
    - Date of birth / Gender
    - Education / Annual income bracket
    - Vehicle ownership /Employment Sector





2014

2021

2036

1. Chelmsford journeys starting

from central zones between 7:00-8:00

WHAT ABOUT THE FUTURE?

- Real time models
- Monitoring traffic
- Short time prediction
- Live feedback about re-routing
- Interaction with connected and autonomous vehicles

THANKS FOR YOUR ATTENTION

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