

Real-Time Electric Mobility Simulation

Eiman ElBanhawy

School of The Built and Natural Environment, Northumbria University
eiman.elbanhawy@northumbria.ac.uk

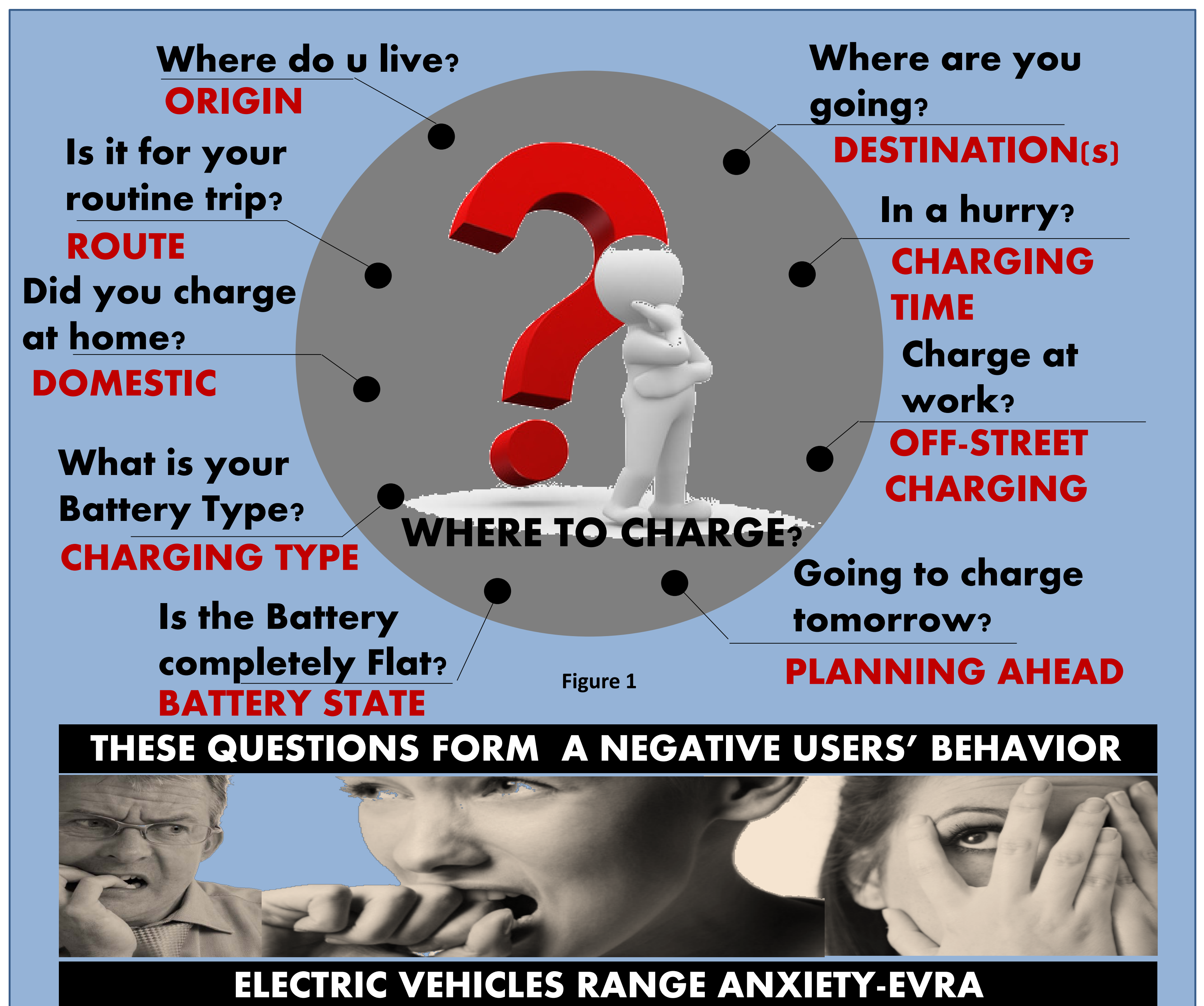
(1) BACKGROUND

- The importance of this study comes from the Environmental burden of urban road traffic;
- It is the major contributor to CO₂ and GHG emissions. In the UK, road traffic contributed by 66.6% from the energy use and 86% of the climate change;
- Developed countries specially across the OECD promote incentives and schemes for low carbon emissions vehicles;
- The study focuses on private and non-commercial cars..

(2) INTRODUCTION

- This study is a part of PhD research project, the *Intrreg IVB North Sea Region Programme (e-Mobility)*;
- The project aims at examining whether the current electric vehicles (EVs) infrastructure supports the present users and can accommodate future users. or planning authorities need to forecast;
- If yes, then where are the optimal locations and how many are needed?
- This poster presents the heuristic approach to examine the integration of infrastructure by employing simulation technique to emulate EV population.

(3) **CURRENT STATE** EV market is a niche market. It has lots of barriers which hamper potential users to join; cost, visual appeal, and battery range. One of the of the main questions that irritates users is **WHERE TO CHARGE?** To answer this question, we need to ask the following? figure1



(4) **HEURISTIC APPROACH** to simulate the phenomenon, the behavioural characteristic of EV population should be depicted in agent based modelling simulation (ABMS). Developing this model requires three main steps A, B and C.

(A) Unique nature of the SYSTEM

- EV system is a sub set of traffic simulation Figure 3;
- Agents' aim is to find the nearest available charging point;
- key components are the battery type, capacity, no. of users, charging location;
- Cars size, speed, brake, gap between them are N/A;

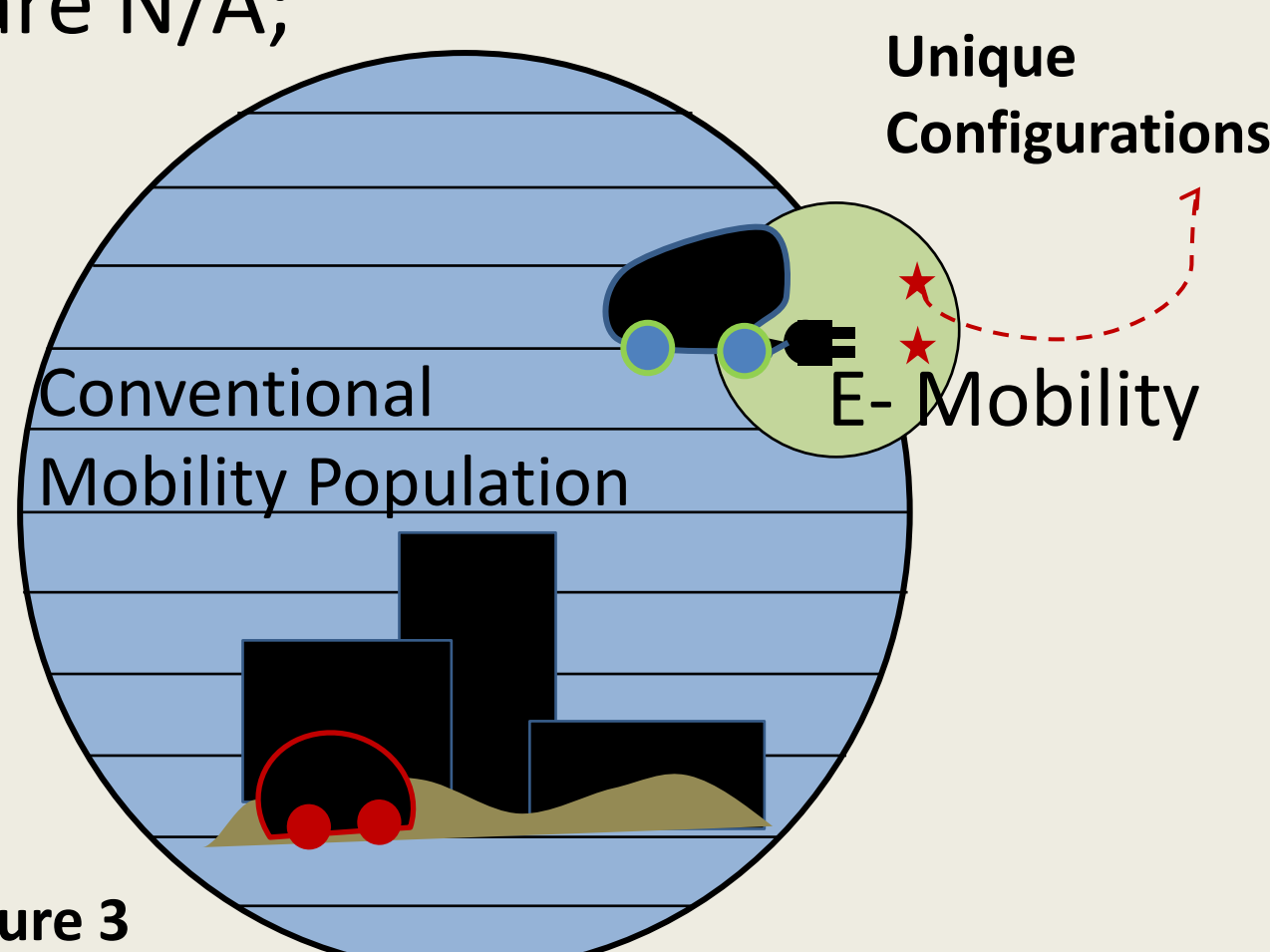


Figure 3

(B) Developing Agent's BRAIN architecture

(B) Agent BRAIN Architecture

▪On a daily basis: the agent takes certain decision as per Figure 4.

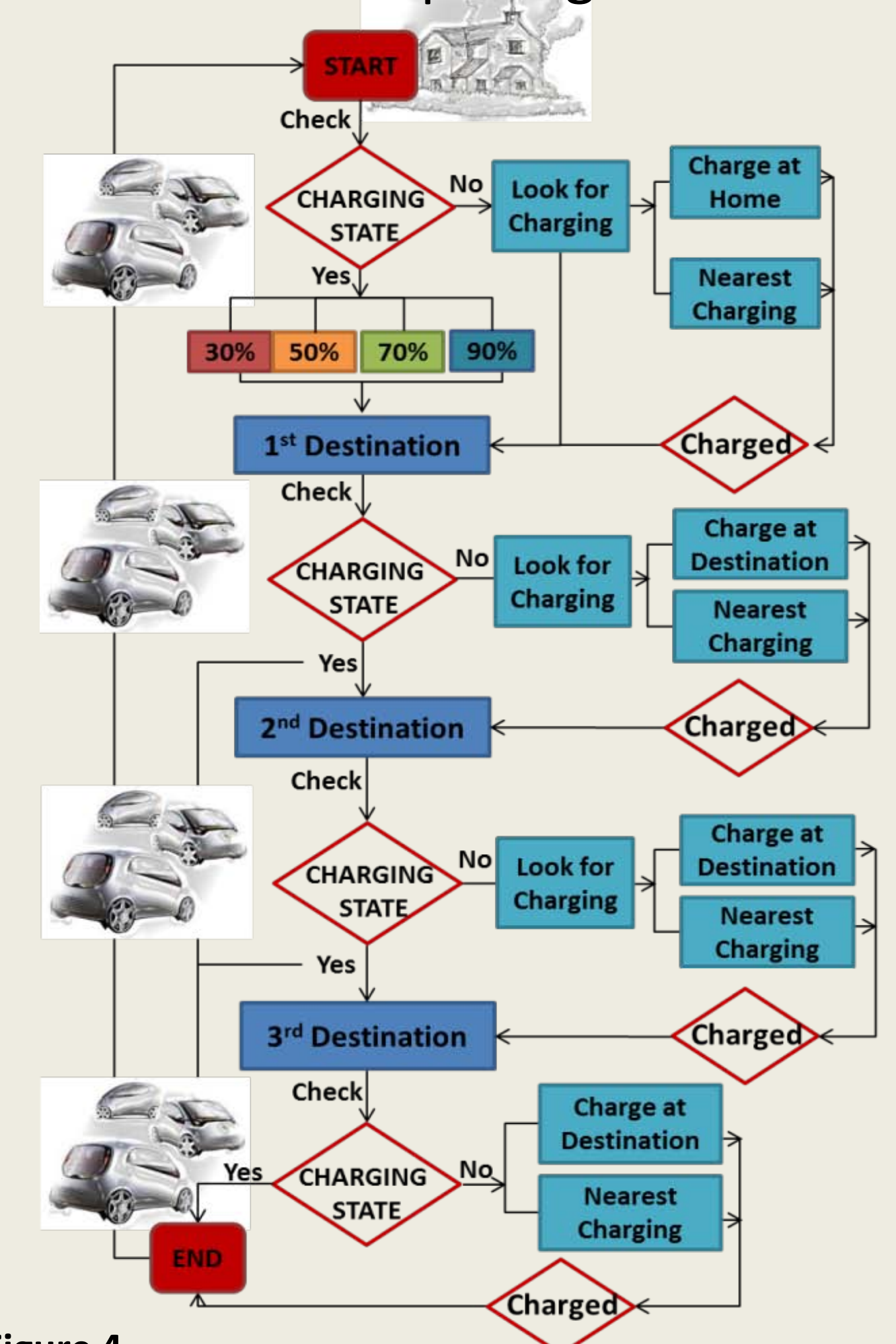


Figure 4

(A) Understanding the Unique Nature of the SYSTEM

(C) Evaluating available PLATFORMS

(C) Available PLATFORMS

- Intuitive and simple ABM software have been evaluated;
- The ABM simulation platform should:
 - ✓ Simulate micro-dynamic, societal and behavioral models;
 - ✓ Fast execution time, interactive and reliable with less coding;
 - ✓ Can be coupled with 3D and GIS;
 - ✓ collect and extract real-time information.

(5) CONCLUSION

- ABM technique has been employed in former literature by studying numerous applications;
- Present study employs ABM to new type of data (e-mobility system);
- EVs Planning authorities and policy makers shall use the outcome of such study.