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Electric Vehicle Symposium & Exhibition

June 19-22, 2016 | du 19 au 22 juin 2016

Montréal, Québec, Canada

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Experiences from Data Collection in Living Labs - The Swedish National Database for Car Movements

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Agenda

- Aim and Scope of the Presentation
- Description of the Database
- Examples of Projects in the Database
- Practical Experiences in Field Work with Living Labs
- Final Comments and Recommendations for Living Labs



Aim and Scope of the Presentation



Aim and Scope of the Presentation

- The aim of the presentation is to share experiences learned from data collection in living labs
- The presentation will focus on data collection and data management
 - Not on results from projects



Description of the Database

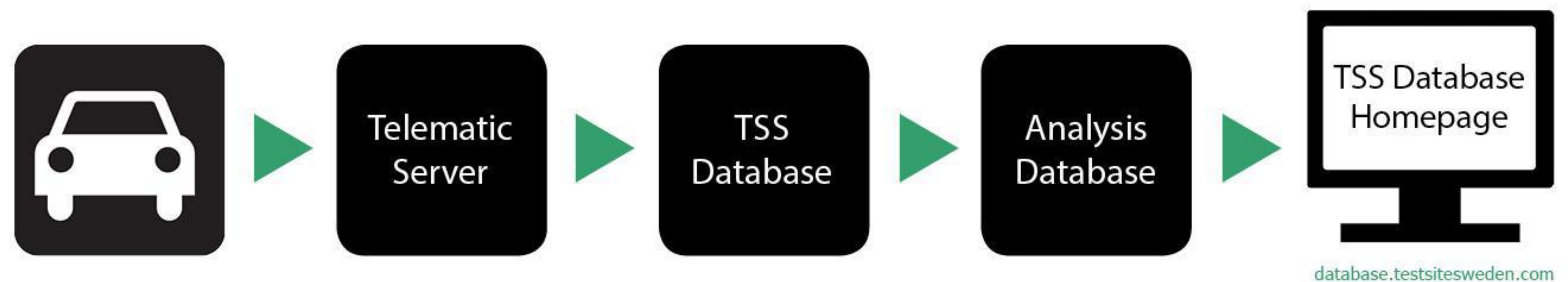


Description of The Database: Basics

- The database is managed by Test Site Sweden at Lindholmen Science Park
 - Was founded 2008
 - Contains about 20 projects
 - Approximately 250 000 car trips
- Data is gathered by loggers installed in the car
 - GPS together with optional information (for example State of Charge)
- Can be accessed through <http://database.testsitesweden.com>

Description of the Database:

TEST SITE SWEDEN DATABASE SETUP:





Examples of Projects in the Database



Examples of Projects in the Database:

Active Living Lab Projects at Test Site Sweden

- Wireless Charging of electric Vehicles-WiCh (Viktoria Swedish ICT)
 - Inductive chargers were installed in 3 cities in Sweden
 - Data collected includes GPS coordinates as well as selected CAN-data
- Car Movement Data 3-CMD 3 (Chalmers University of Technology)
 - The replacement with an electric car in two car households
 - Data collected is GPS-position as well as CAN-data



Examples of Projects in the Database:

Results from Data Collection In Living Labs: WiCh

- For more information, see *Large scale testing of wireless charging in Sweden*, Stefan Pettersson (Session 3C)



Examples of Projects in the Database:

Results from Data Collection In Living Labs: CMD 3

- For more information see: *How are driving patterns adjusted to the use of a battery electric vehicle in two-car households?* Niklas Jakobsson (Session 3F)



Practical Experiences in Field Work with Living Labs



Practical Experiences in Filed Work with Living Labs: Connectors and Cables

- The logger was powered from **the cigarette lighter** contact
 - This was loose in many cars
 - Could be used by the test-persons for other purposes
 - Splitter cables could be used but they were another source of error
 - The functionality of the cigarette lighter varies in different cars
 - If active all the time, the logger is never turned off which can give the car battery problems
 - This problem was addressed by turning the logger off after a certain period when the car didn't move



Practical Experiences in Field Work with Living Labs: Connectors and Cables

- **The GPS-antenna**

- Magnetic puck that is put onto the roof of the vehicle
- The cord from the antenna needs to go through the door-may lead to breakage
- The cord that is pressed into the antenna can come loose-leads to the unit not logging
- Many test-persons didn't want the antenna on the roof of the car
 - Bad positioning of the GPS-antenna can lead to not getting GPS lock
- GPS lock can be a problem in urban areas
 - Leads to the trips logging as shorter than in reality
 - Analysing the problem afterwards is difficult



Practical Experiences in Field Work with Living Labs: Connectors and Cables

- **Bad Cellular Coverage**
 - Data default when coverage was low and logger needed to resend data
 - Caused the logger to be overloaded and forced it to restart-resulted in lost data during a 15 minute period
 - Problem was addressed by demanding better signal strength in order to initiate transmission of data



Practical Experiences in Filed Work with Living Labs: Lessons Learned from Logging

- **CAN logging**

- In order to obtain certain CAN-data, the logger was connected to the OBD-port in the car
- Reversed engineering needs to be done for each car model which is very time consuming
- CAN data should not be read too frequently as this might cause the logger to be overloaded



Practical Experiences in Filed Work with Living Labs: Lessons Learned from Administration

- **Management of Test persons**
 - Shown to be a time consuming task
- **Cars**
 - Storing cars for a long period of time gave rise to extra work
 - Exchange of tires
 - Exchange of car batteries
 - Washing of the cars
- **Loggers**
 - The cost of programming, fixing bugs and general support of the loggers has been high



Final Comments and Recommendations for Living Labs



Final Comments and Recommendations for Living Labs

- Main lesson learned from living lab is that much time is needed for management and administration
- It is important to make the test persons feel involved in the project
 - A way to accomplish this is to reuse the test persons from other living labs
 - Keeping the test persons informed before, during and after the project is a key for success



Final Comments and Recommendations for Living Labs

- In order to reach a good budget estimation a detailed risk analysis is recommended and a fixed price should be negotiated with all partners
- Keep the system set up as simple as possible
 - If possible avoid cables
 - Hire equipment rather than investing in equipment