Creating an Internet of Things Ecosystem for Transport

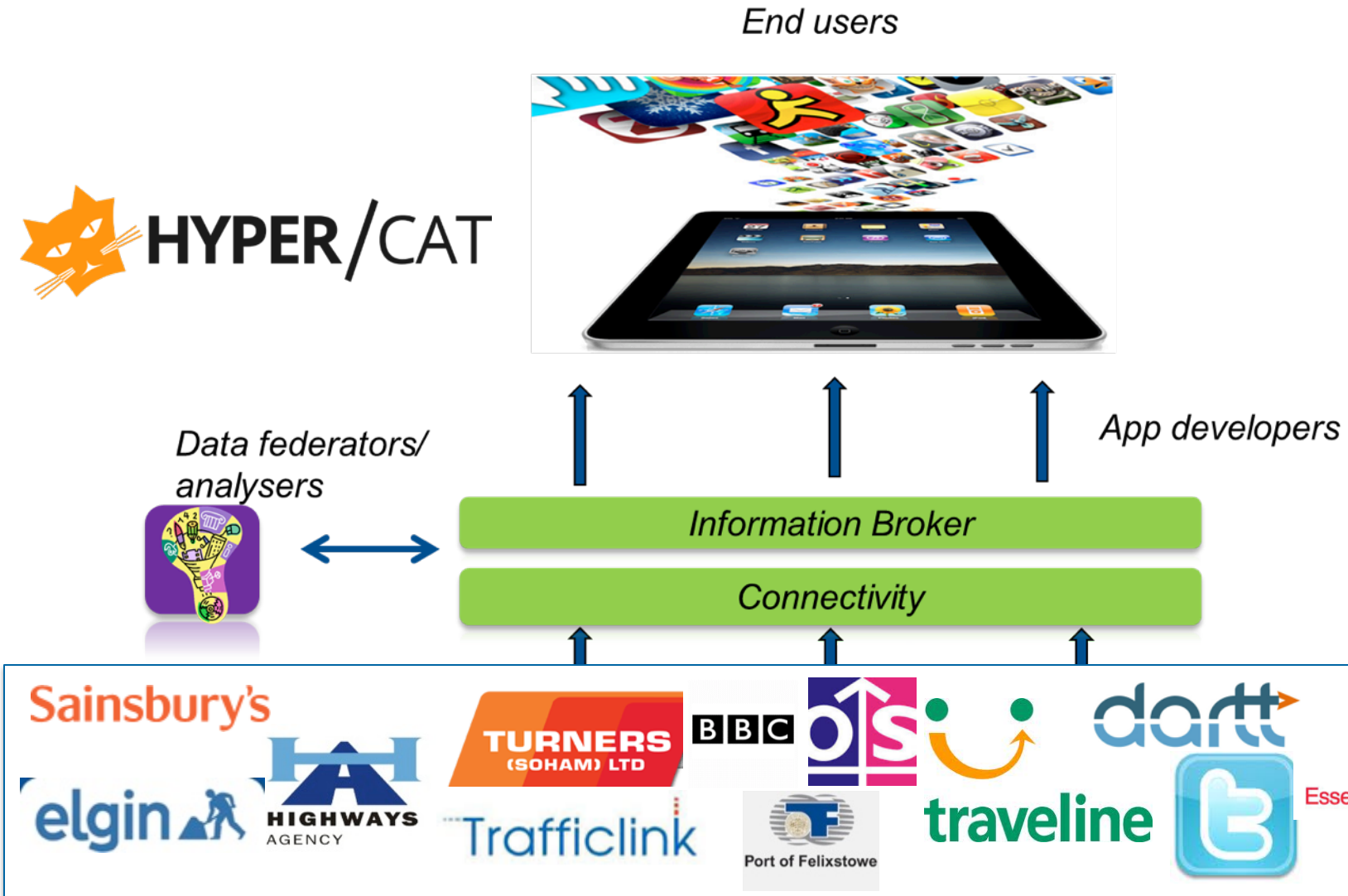
Dr Alistair Duke, BT Research and Innovation

Smart Systems Summit 2014 London at the IoD
1-2 October 2014, London, UK
www.hvm-uk.com

Stride project

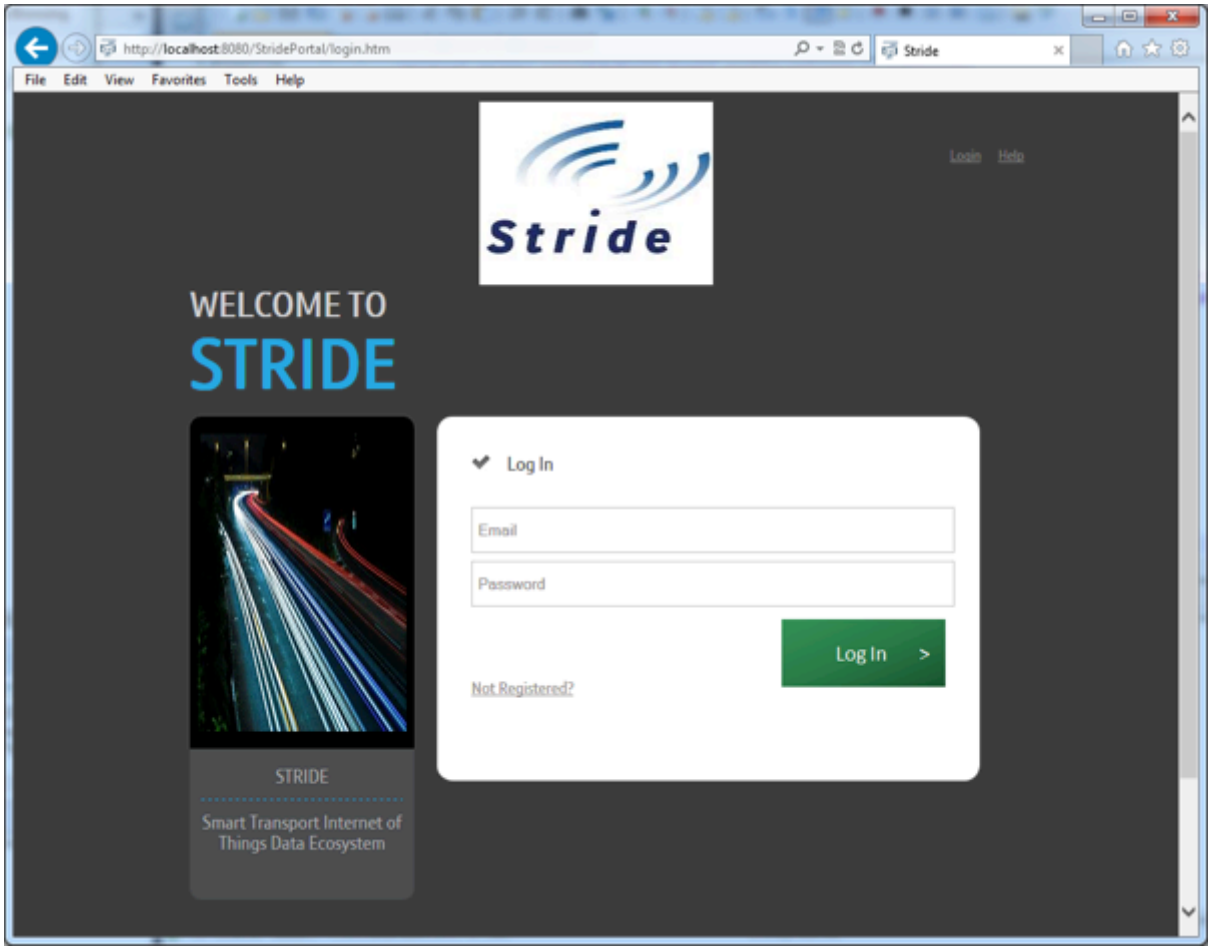
- To build a critical mass of easily accessible transport data
- To create a community of app developers creating innovative transport applications
  - Lowering barrier to participation
- To explore new business models & opportunities & consider technical, legal & commercial issues

IoT ecosystem



BT

Portal Login Page – Developer and Provider
portal.stride-project.com



Data Representation

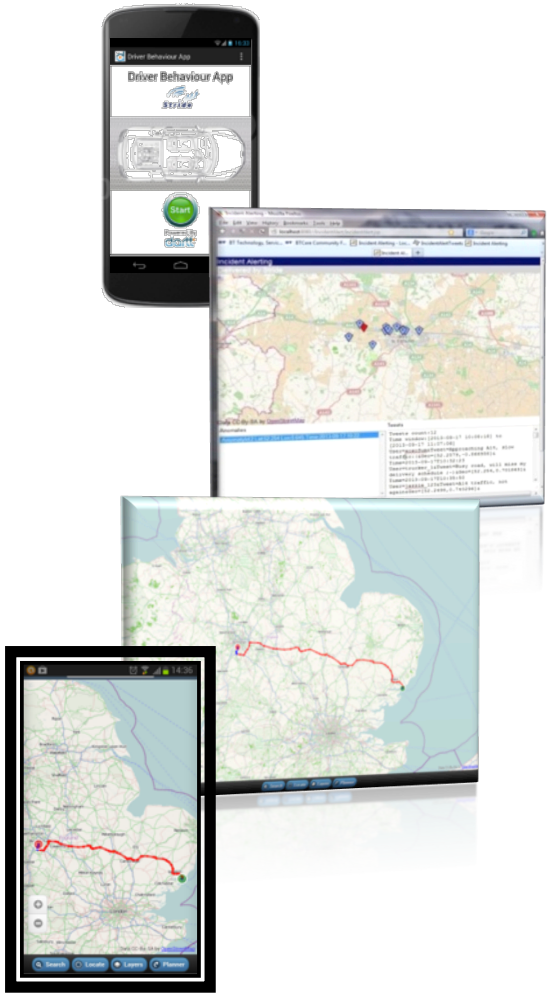
- EEML and CAP are the XML-based data representation in the hub
- Location, time, data
  - ‘data’ can be anything
- Moving to a richer semantic approach to data modelling

BT

Apps demonstrating value

- Driver Assist
  - Better fuel efficiency
- Journey Time Prediction
  - Predictive model + real-time information
- Travel dashboard
  - Multimodal planning
- Incident Alerting
  - Detect anomalies & mine social media
- Driver Behaviour & Driver Assist
  - BYOS (smartphone)

- Plus *external developers*
  - Cambridge University Transport Hackathon
  - Hackathon & Smart Cities event (Leeds)
  - Developer contest



BT

Stride

BT

TURNERS (SOHAM) LTD

dartt

Driver Assist Application

BT

AIMES GRID SERVICES

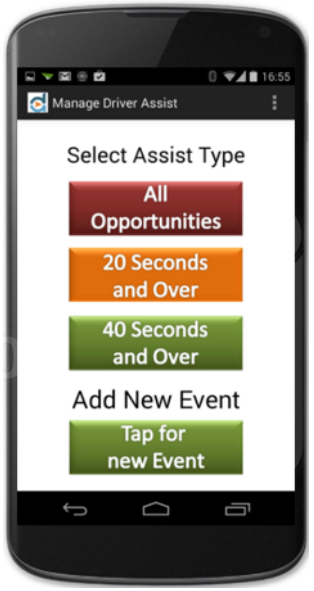
Ctrl SHIFT

UNIVERSITY OF CAMBRIDGE

dartt

Driver Assist

- Advises HGV drivers on optimum driving technique for fuel efficiency and CO2 reduction.
- Uses terrain data, road layout information, vehicle speed and other sensor data to determine the most appropriate location to start “Good Coasting” (in gear, no throttle and no cruise control) and maneuvering points such as junctions and slip roads



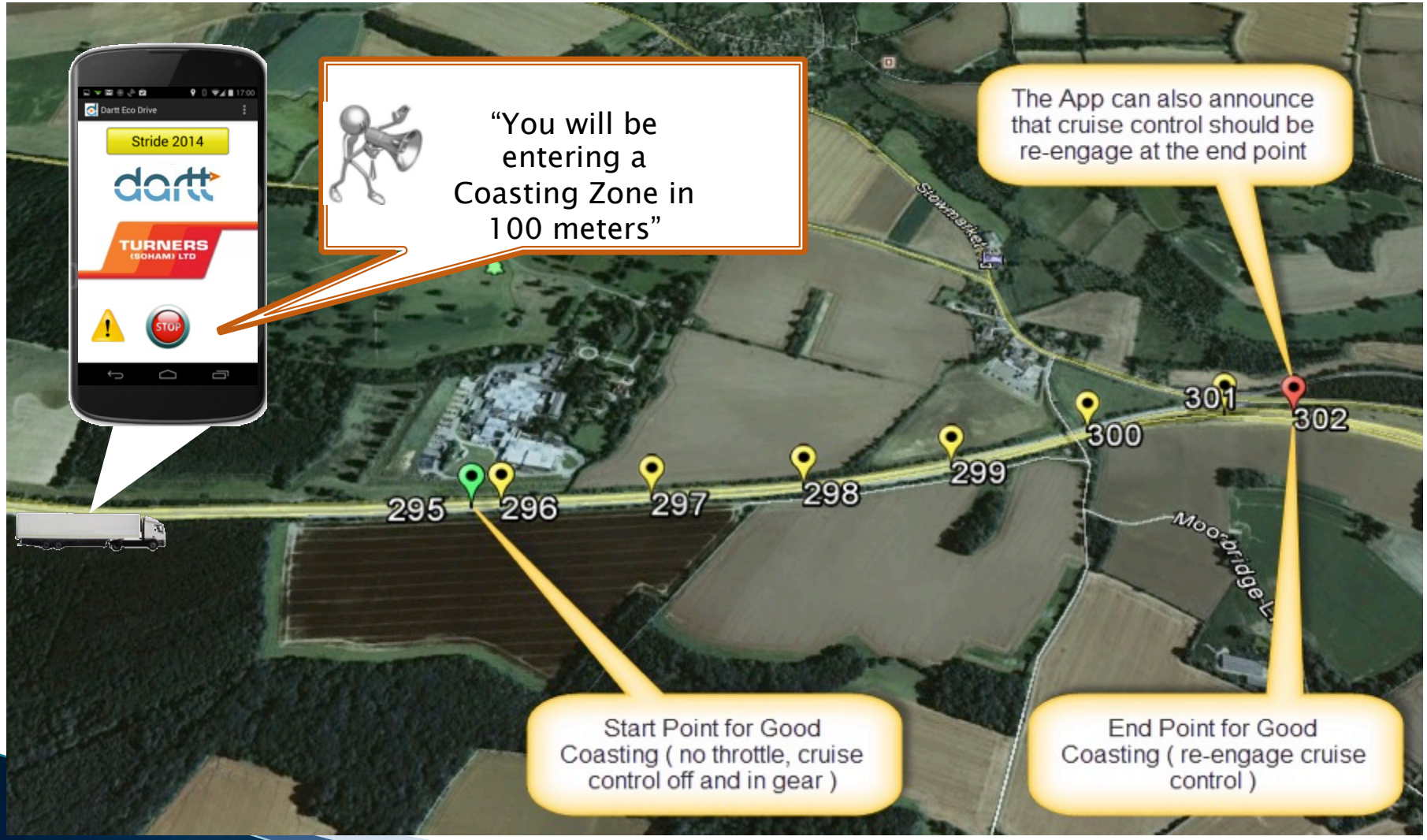
Exploitation:

Initial purchase of 10 units from Turners

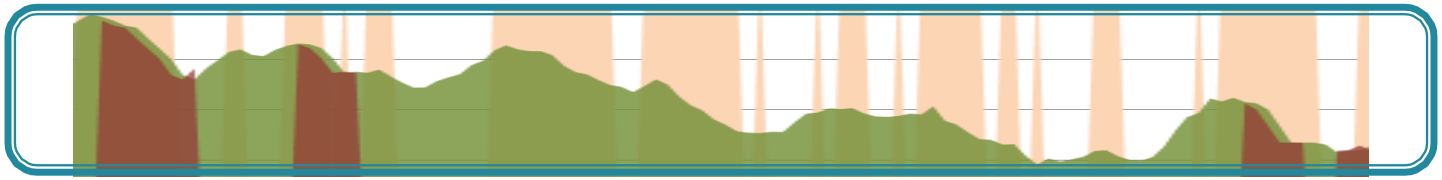
Interest from National Express & BT Fleet

Driver Assist: Ensuring maximum fuel efficiency and reducing emissions

- The **Driver Assist App** constantly checks the vehicle location, speed and the other essential information. Advises driver of coasting opportunities



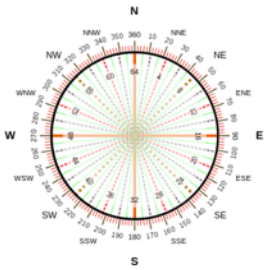
Altitude vs Eco Drive



Driver Assist can now auto-predict locations for any known route (eg KML) based on :-

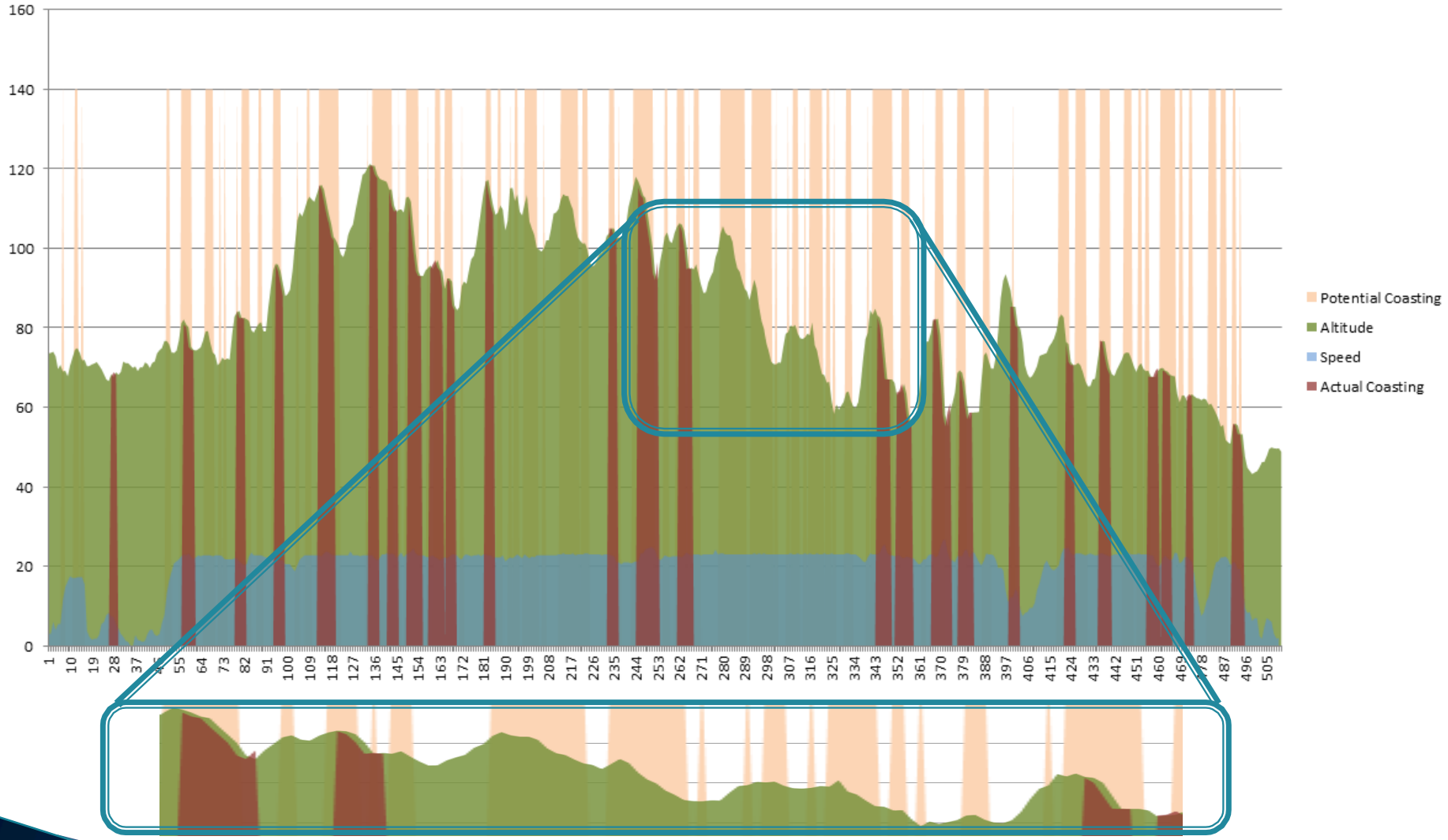
- Altitude change
- Speed of vehicle
- Direction of travel

Additional data could include :-



- Gross weight of tractor and trailer (rolling distance)
- Weather (wind)
- Driver activities such as location-specific delivery instructions (speed limits, etc)

Altitude vs Eco Drive



What are the benefits?

- Reduced costs, CO2 reduction
- Smarter approach to fuel usage based on a wider range of data
  - road conditions, weather, traffic volumes, gradient, route
  - Turners: 1.6p per mile savings
- UK HGV fleet: 15.43 Billion miles per year @1.6p per mile
  - **£246m**

2014 UK IT INDUSTRY AWARDS
bcs The Chartered Institute for IT computing
FINALIST

Stride

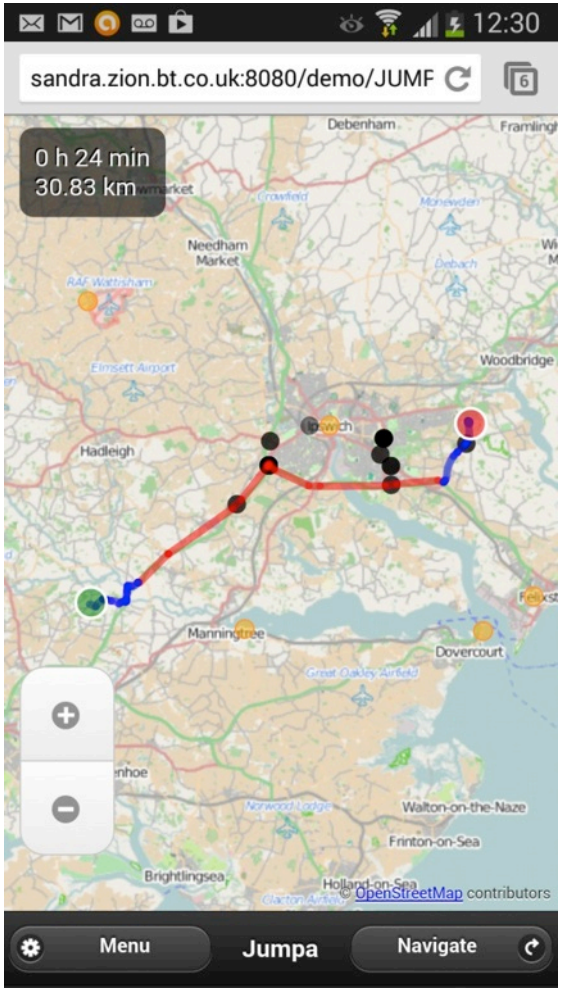
JUMPA Application

JUMPA – Journey Planning & Prediction

- Results based on departure time, combining real-time data and predictive model
- Integration of information from multiple data sources, filtered by route
- Same experience across different devices and browsers (smartphones, web interface)
- Good performance in pilot, journal paper in preparation

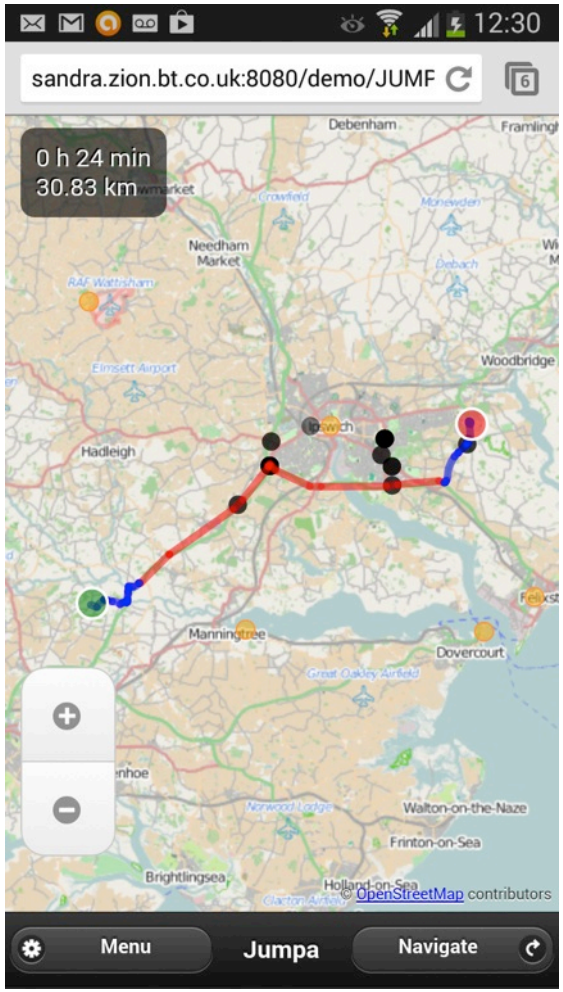
Exploitation:

- Primarily as a service for other apps
- Usage in Driver Behaviour App & Travel Dashboard
- Interest from Turners for suggested departure time service



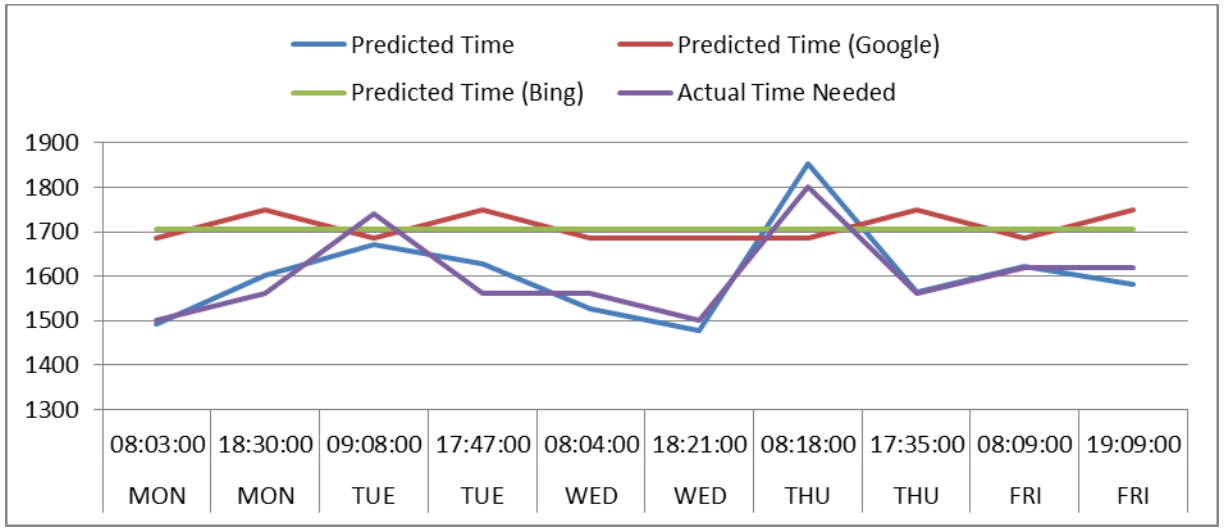
JUMPA Features

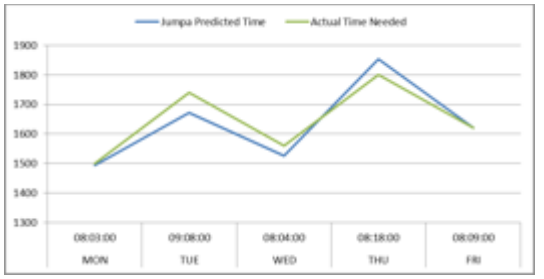
- Use of journey time prediction service
- Results based on the chosen departure time
- Filtered retrieval of information along the route
- Same experience across different devices and browsers (smartphones, web interface)

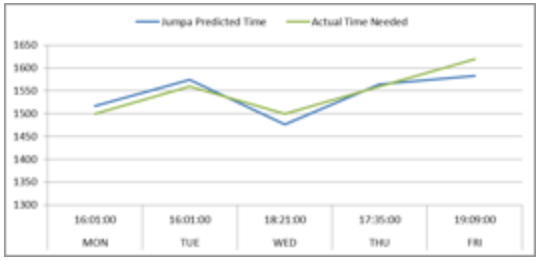


http://sandra.zion.bt.co.uk:8080/demo/JUMPA.html

JUMPA trial







- Route over trunk (A12,A14) and non-trunk roads
- Comparing predicted against achieved time
- Comparing against other web services

Stride

Driver Behaviour Application

BT

AIMES GRID SERVICES

Ctrl SHIFT

UNIVERSITY OF CAMBRIDGE

dartt

Driver Behaviour Application

- Simple to use with a “Start/Stop” button
- Monitors Driver Behaviour using built in sensors and data from the BT Hub
- Provides data back to the Hub including pothole location and severity, road speed data, road surface index and User Events
- Integrated with Jumpa, weather information and six other data sources from the BT Hub
- Text-to-speech engine reads relevant info from the Hub to the driver during a journey

Data Flow

HIGHWAYS AGENCY

VMS
Matrix Signal

elgin

Elgin incident
Elgin obstruction
Elgin roadworks

Trafficlink

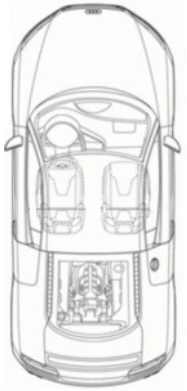
Met Office

Journey Time Prediction

- Driver Behaviour Analysis
- 10 second Location Updates
- Trunk Road Speeds
- Local Road Speeds
- Road Surface Index
- Pothole Locations
- Slow Moving Traffic
- Stationary Traffic
- Traffic Flow – Use of Cruise
- User Events – Accident
- User Events – Unexpected Queue
- User Events – PANIC !

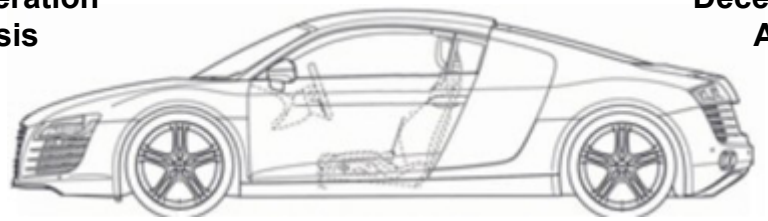
Driver Behaviour Data Gathering

Cornering Analysis



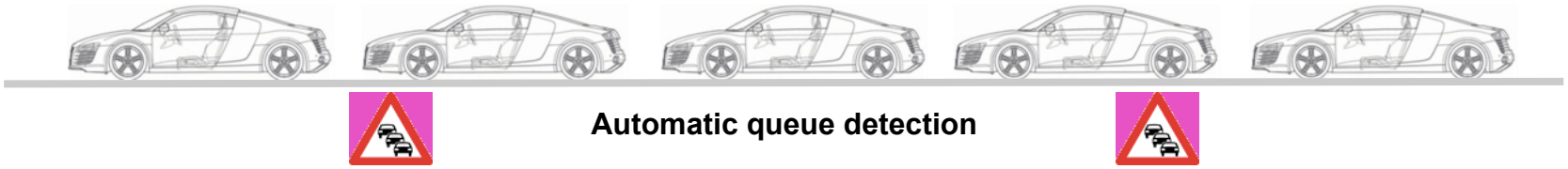
Cornering Analysis

Acceleration Analysis

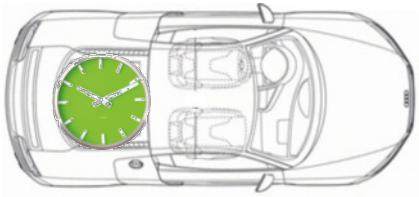


Deceleration Analysis

Pothole and road surface Analysis

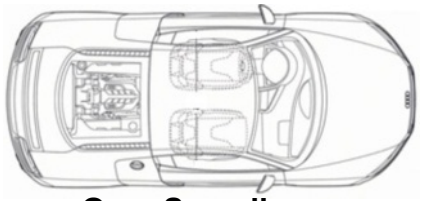


Automatic queue detection

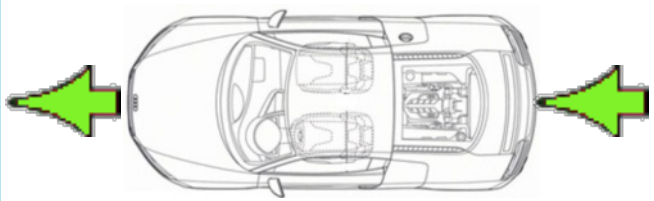


Engine Idling Monitor

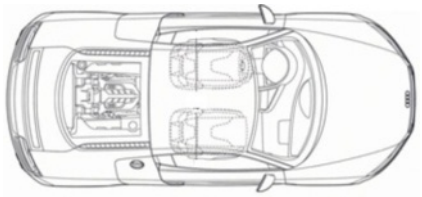
Driver Notification



Over Speeding



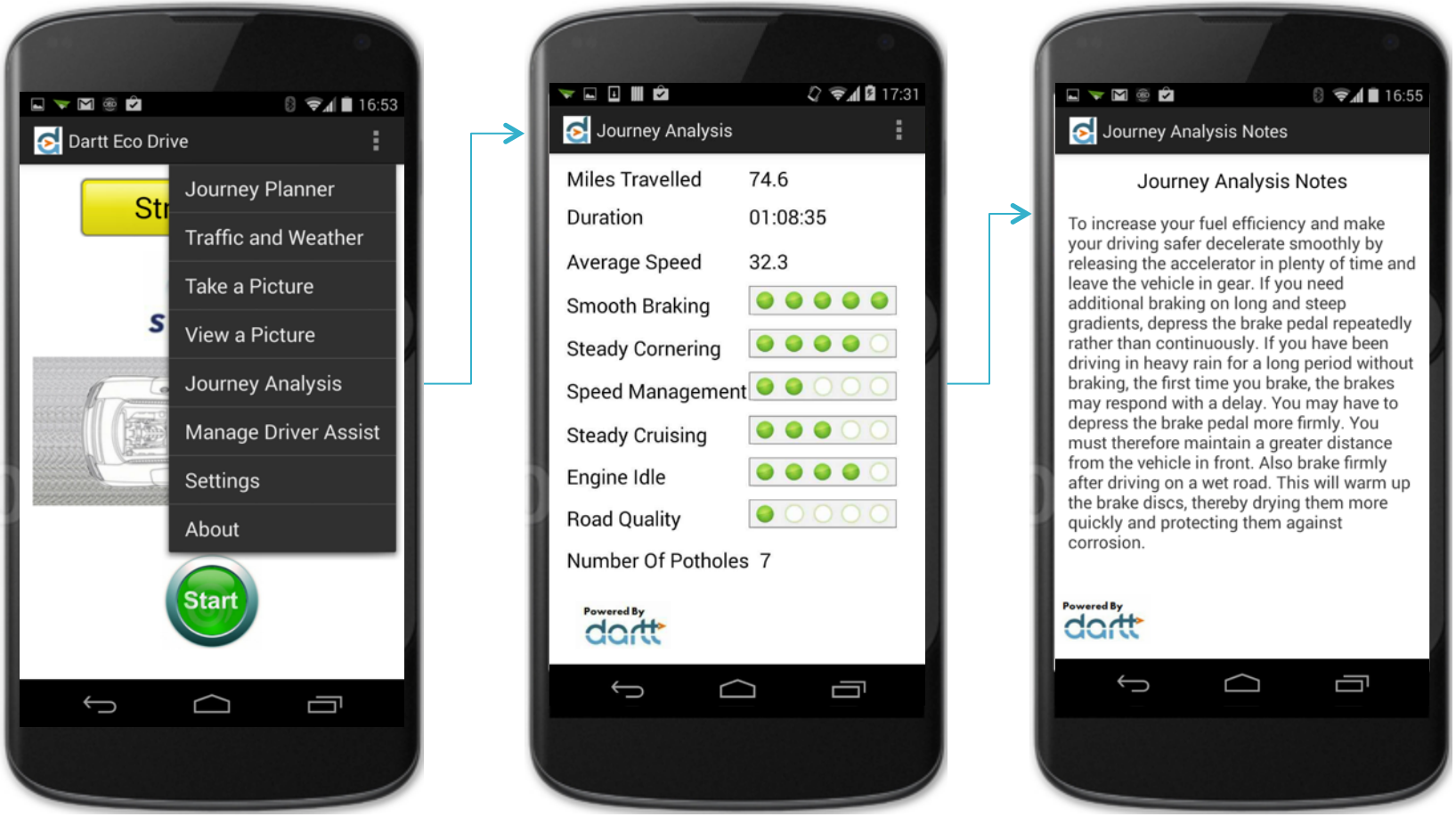
Use of Cruise Control



Excessive Speeding

Driver Behaviour App In-Cab

Journey Analysis



Snail Trail and Driving Analysis

Stride

Traffic Incident Alerting Application

BT

AIMES GRID SERVICES

Ctrl SHIFT

UNIVERSITY OF CAMBRIDGE

dartt

Overview

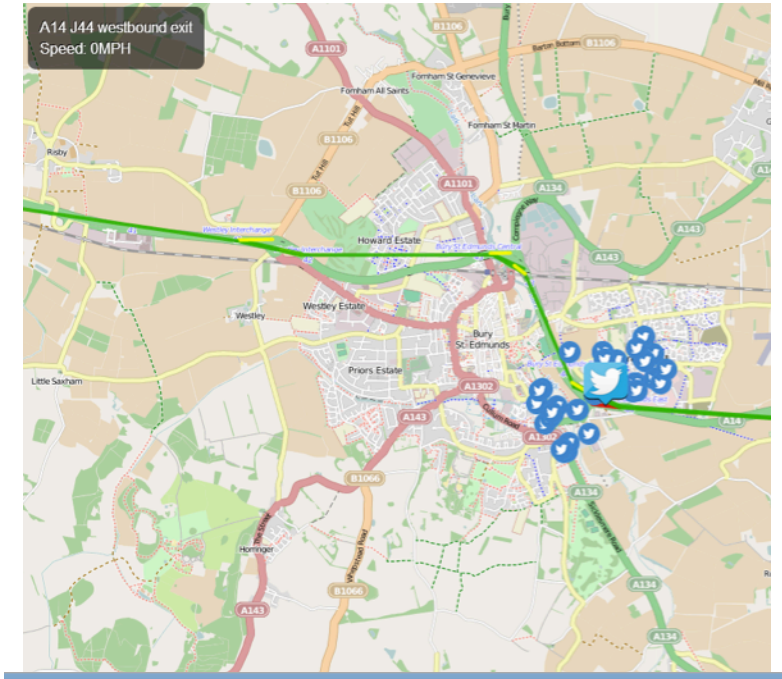
- Combining traffic speed and incident data with social media analysis

- App for road users:
  - better information about nature and severity of delays
  - provide information via integrated channel

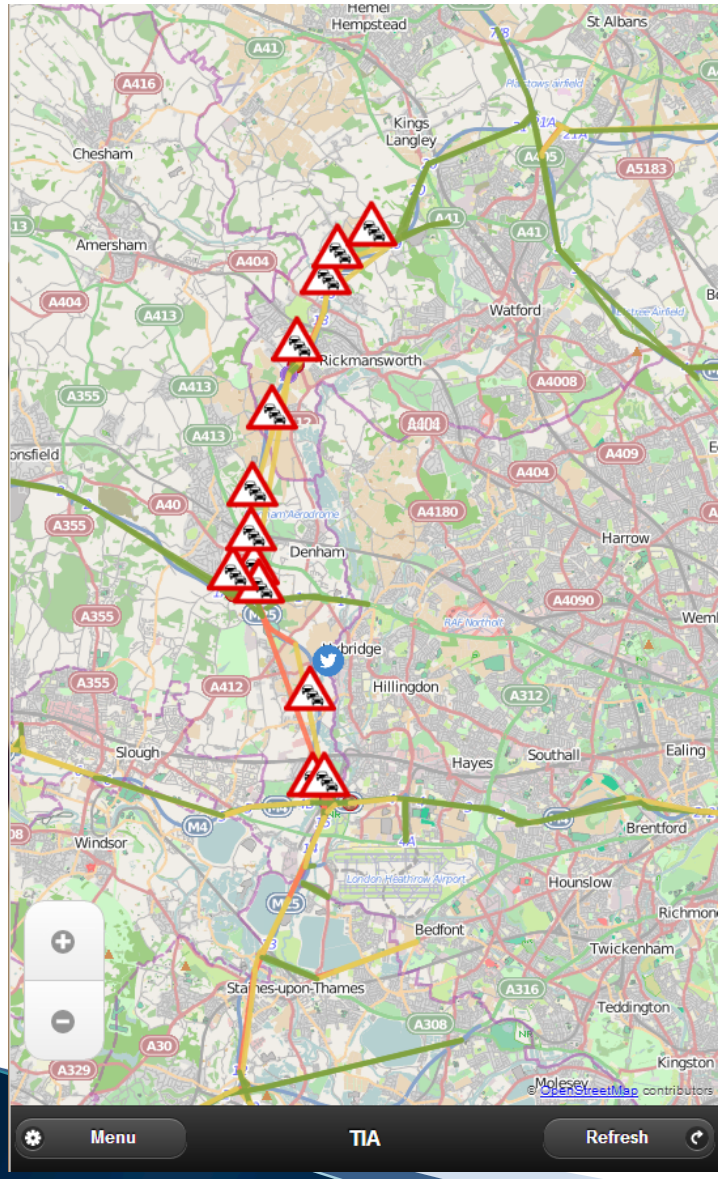
- Application for emergency services, local authorities, etc.:
  - Wider source of data about incident from social media

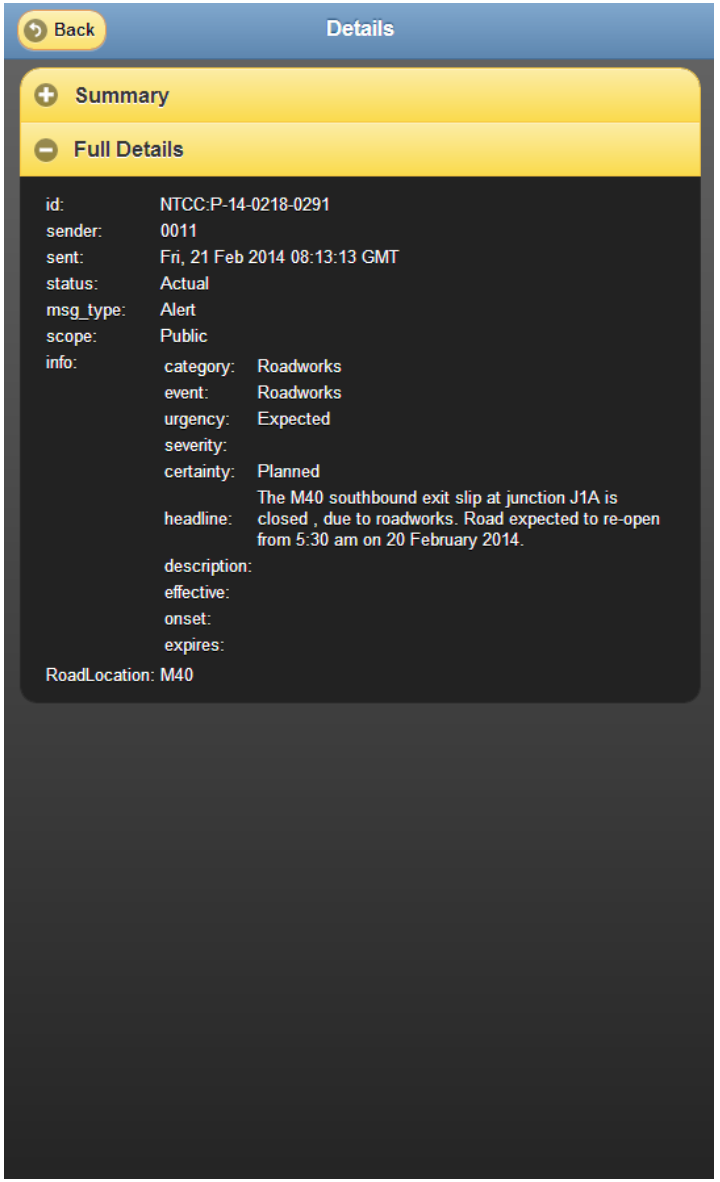
Traffic Incident Alerting

- Colour coded routes based on live road speeds
- Display of tweets near selected location
- Provides a legal and safe way for drivers to tweet about incidents
    - Auto tweet button via app authorisation
    - Tweets location, heading, speed etc. via hub
    - Tweets back with information about incidents
    - Encourages use of existing medium (Twitter) rather than trying to establish new one.



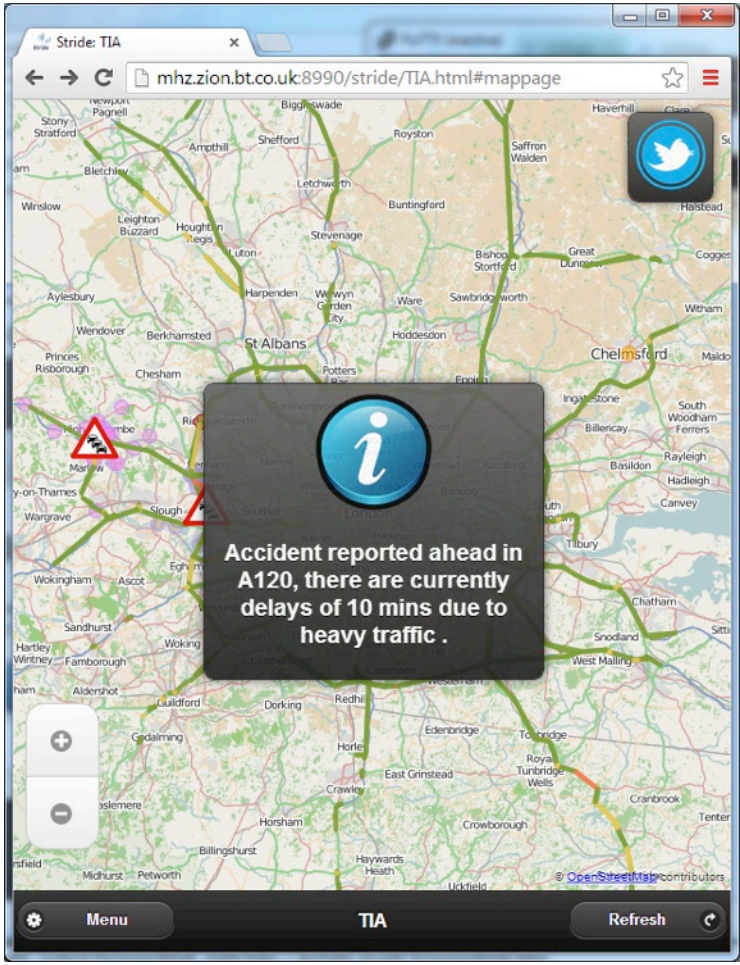
TIA


Hemel Hempstead
St Albans
Kings Langley
Chesham
Amersham
Watford
Rickmansworth
Denham
Harrow
Hillingdon
Slough
Hayes
Southall
Ealing
Windsor
Brentford
Hounslow
Bedfont
Twickenham
Teddington
Kingston
Molesey
© OpenStreetMap contributors
Menu
TIA
Refresh


Back
Details
Summary
Full Details
id: NTCC:P-14-0218-0291
sender: 0011
sent: Fri, 21 Feb 2014 08:13:13 GMT
status: Actual
msg_type: Alert
scope: Public
info:
category: Roadworks
event: Roadworks
urgency: Expected
severity:
certainty: Planned
headline: The M40 southbound exit slip at junction J1A is closed , due to roadworks. Road expected to re-open from 5:30 am on 20 February 2014.
description:
effective:
onset:
expires:
RoadLocation: M40

TIA - AutoTweet

- Low volume of tweets observed around incidents
- Need a legal and safe way for drivers to tweet about incidents
- AutoTweet button with Twitter app authorisation
- Tweets location, heading, speed etc. via hub
- Tweets back with information about incident
- Encourages use of existing medium (Twitter) rather than trying to establish new one.



http://sandra.zion.bt.co.uk:8080/demo/TIA.html

Stride

Travel Dashboard

BT

AIMES GRID SERVICES

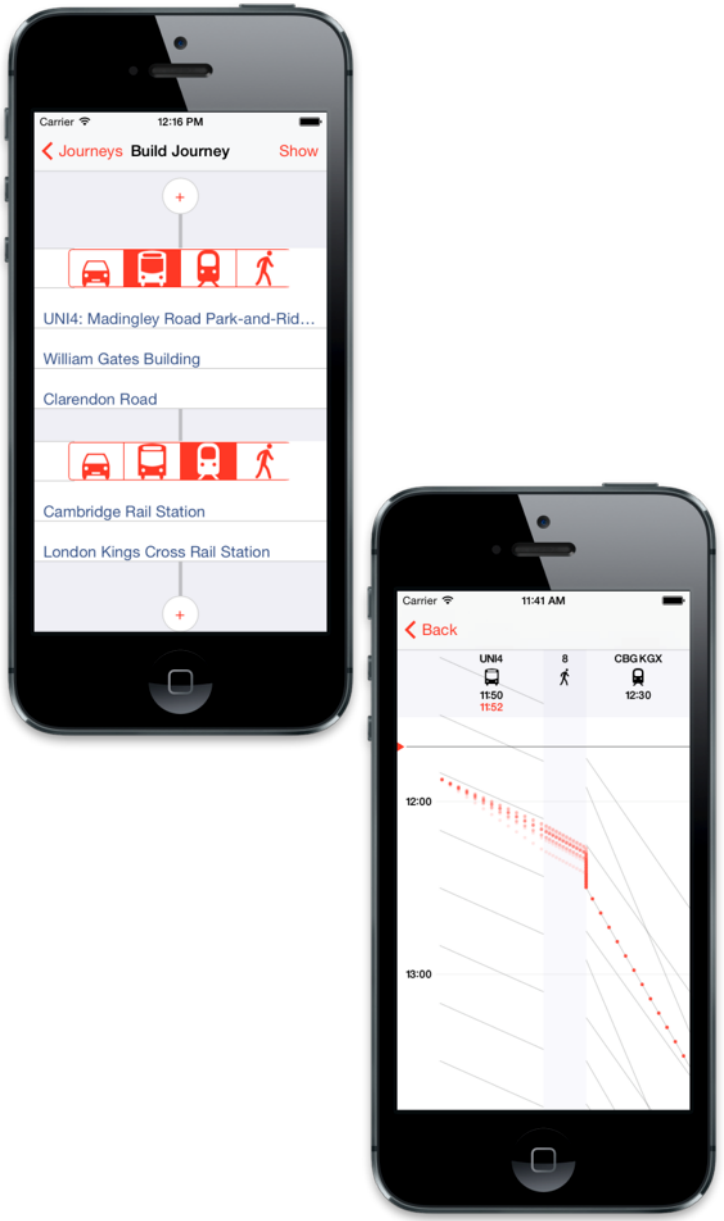
Ctrl SHIFT

UNIVERSITY OF CAMBRIDGE

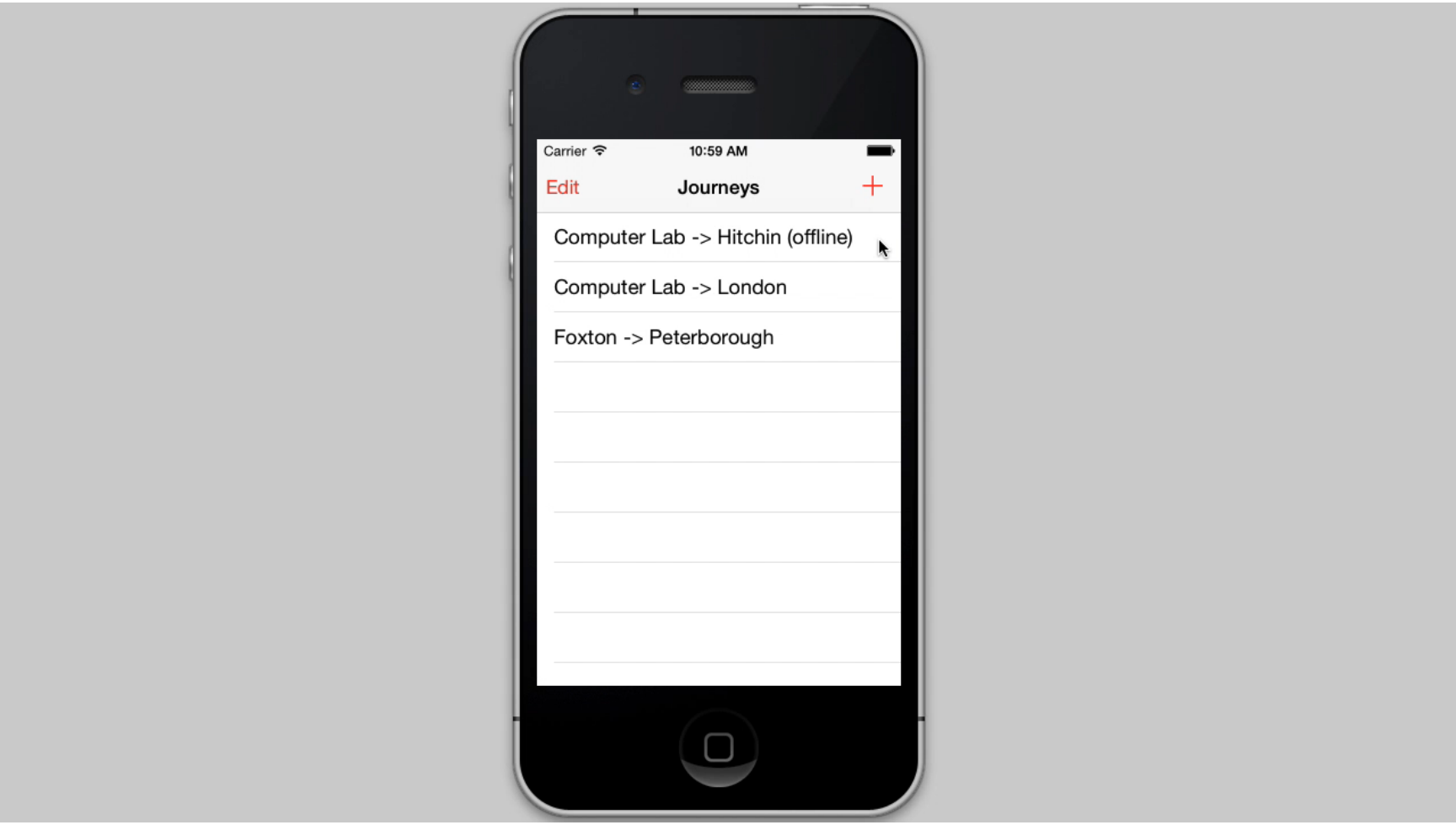
dartt

Travel Dashboard

- Helps users with multi-segment multi-modal journeys
- Key features missing from existing mobile applications:
  - Lets user choose their preferred routing and modes
  - Shows the interaction between journey segments
  - Uses historical/live data on actual performance, doesn't just believe the timetable!
  - Only app able to combine live information about multiple journey segments
- Source code released under Apache OSS license

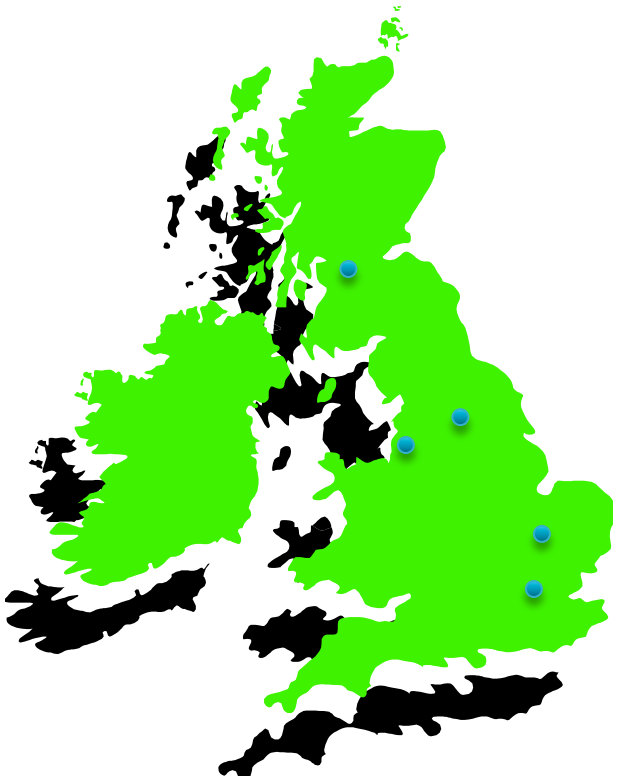


Travel Dashboard Demo



Hackathon Events

- Cambridge – 9th October
- Glasgow – 5th November (with iMove)
- Liverpool – 29th November (with iMove)
- Leeds – 12th February
  - Joint with regional networks
- London – 18th March
  - Cabinet Office & Network Rail



App Highlights : Railsponsibility

http://dico.im/railspon

A Twitter based app that allows the user to send a formatted tweet to start monitoring the train for potential delays. The backend would then start monitoring the train along the route, and in case there has been delay at the end of the journey, the app will tweet back details to support the user in claiming a refund.

Key Project Outcomes

- Information Hub deployed with 30+ sets of homogenised data
- Set of apps showing illustrating benefits of hub and wider ecosystem
  - Exploitation paths identified
- Technical and commercial challenges and enablers identified and explored

http://www.stride-project.com

Following Stride

- TSB Phase II – Hypercat project
  - Scaling Impact and Exploitation
  - Greater Interoperability
- MK:Smart
  - Innovative actions on **transport**, **energy** and **water** tackling crucial demand issues by realising innovative solutions on top of adata hub
  - An integrated programme of **business engagement**, aiming at facilitating business take-up of the innovation capability developed in MK:SMART and at fostering the development of new SMEs.
  - A **smart city education programme** targeting a wide range of audiences, from local schools to HE students and businesses.
  - Targeted actions **to engage citizens in the innovation process**

BT

Thanks for Your Attention

BT