



INTEGRATING PREDICTIVE ANALYSIS TOOLS IN TARGET SETTING AND MONITORING

GEORGE URSACHI & ANDREW HARTLEY, 2017

agilysis.co.uk



AGENDA

- » About us
- » Background
- » Setting and monitoring targets
- » Hotspot (blackspot) identification
- » Hotspot prediction
- » Practical example – Wales Most Dangerous Roads
- » Conclusions and discussions



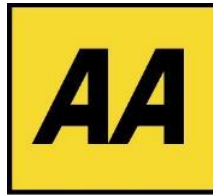
ABOUT US

- Agilysis
 - An experienced team of independent specialists in collision and casualty analysis, evaluation, online analysis systems, intervention design, training, research and more
- Authors
 - George Ursachi – specialised in research and evaluation design, methodologies and implementation
 - Andrew Hartley - specialist in spatial data analysis and digital cartography





ABOUT US



agilysis



BACKGROUND

- Road traffic injuries Worldwide (WHO, 2015)

Over 1.2 million fatalities/ year

The leading cause of death among young people aged 15-29 years

Road traffic crashes cost most countries 3% of their gross domestic product

Predicted



The fifth leading cause of death by 2030 (currently the ninth)



SETTING AND MONITORING TARGETS

2030 Agenda for Sustainable Development

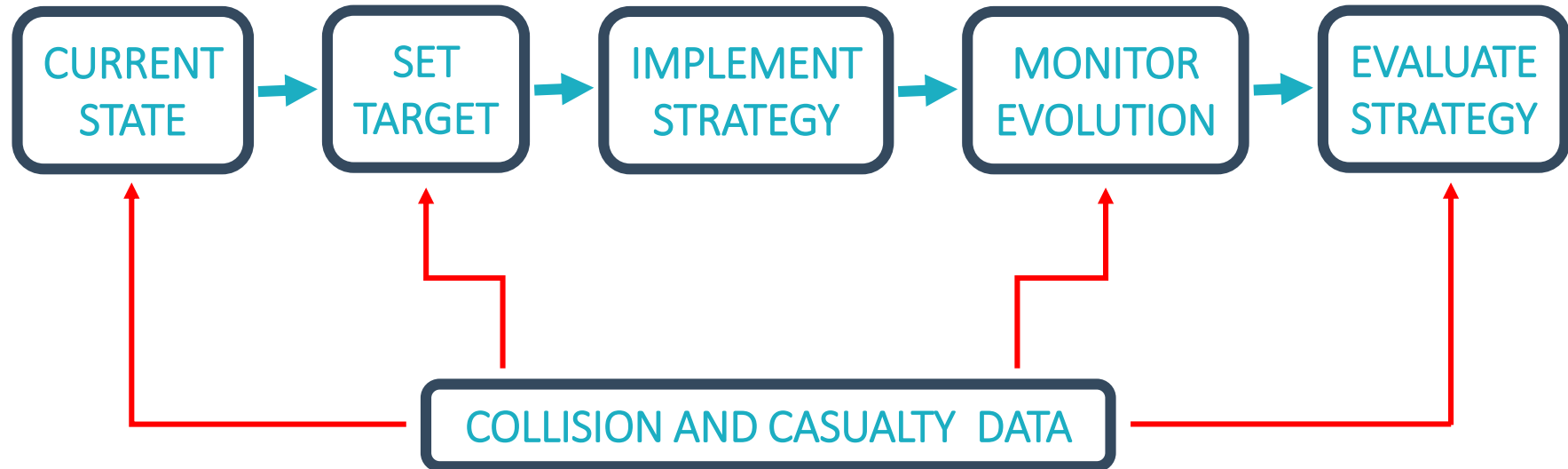
Ambitious target



Halving the global number of deaths and injuries from road traffic crashes by 2020



SETTING AND MONITORING TARGETS





HOTSPOT (BLACKSPOT) IDENTIFICATION

“Sites where the actual values are much larger than the normal or threshold values are 'blackspots', which should be the subject of further studies and possibly treatment”

(Carlsson & Hedman, World Bank, 1990)



HOTSPOT (BLACKSPOT) IDENTIFICATION

Identification of hotspots

- Site length
- Number of collisions
- Scores or indices

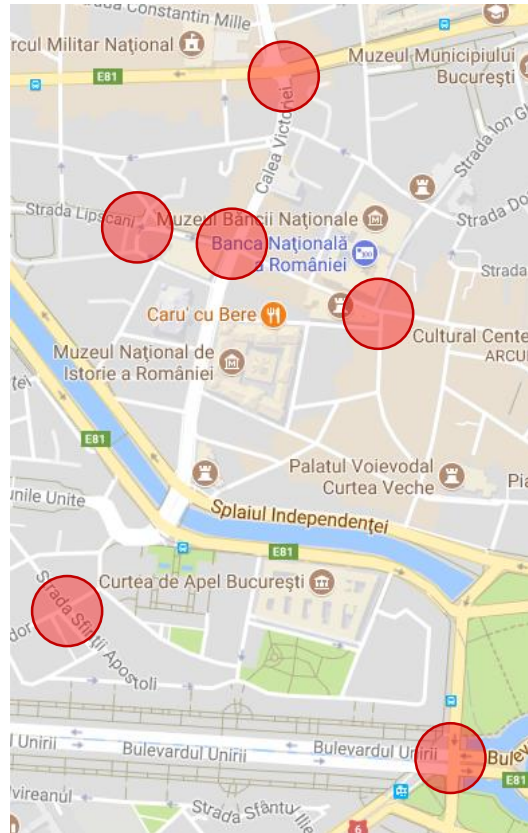
Identification of treatment

- Evidence of factors
- Conditions and context
- Suitability

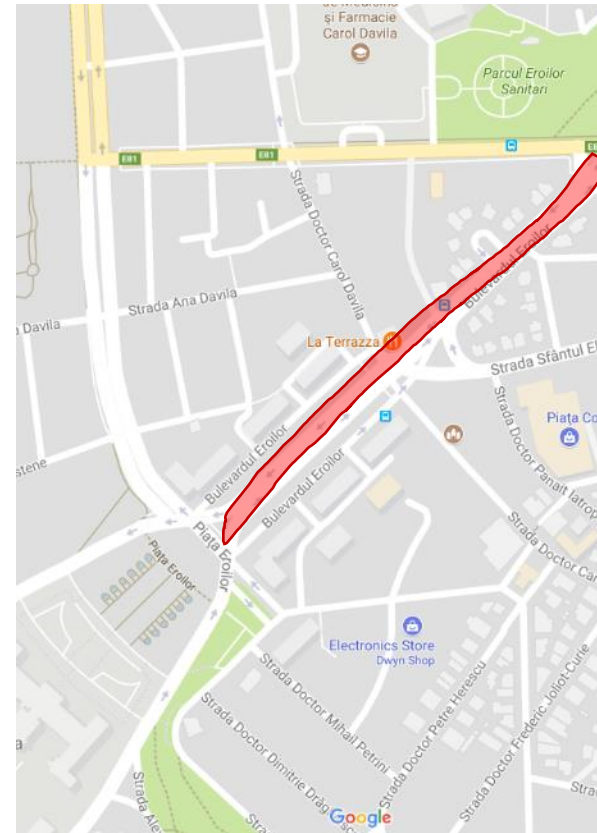


HOTSPOT (BLACKSPOT) IDENTIFICATION

CLUSTER



POLYGON

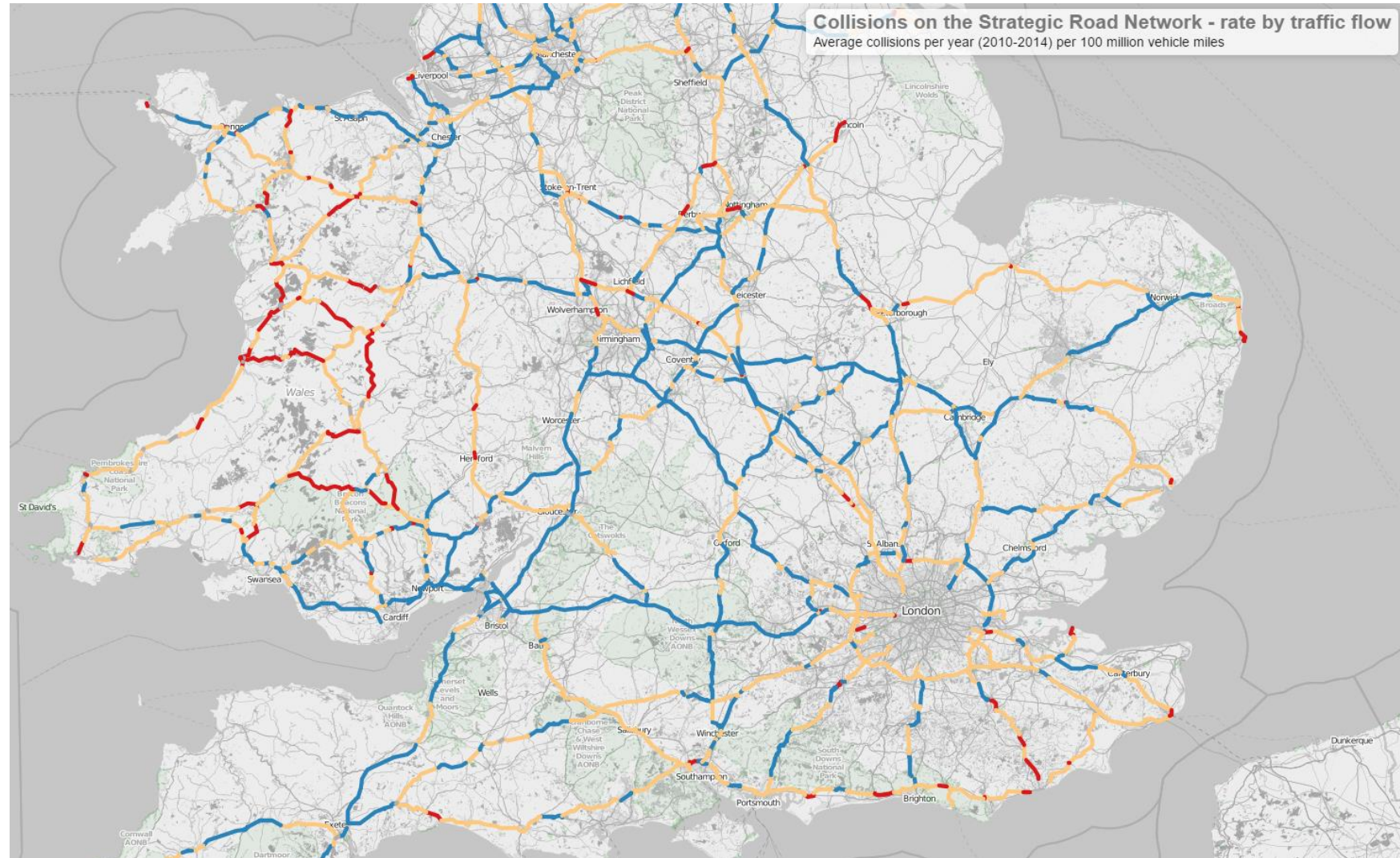


ROUTE



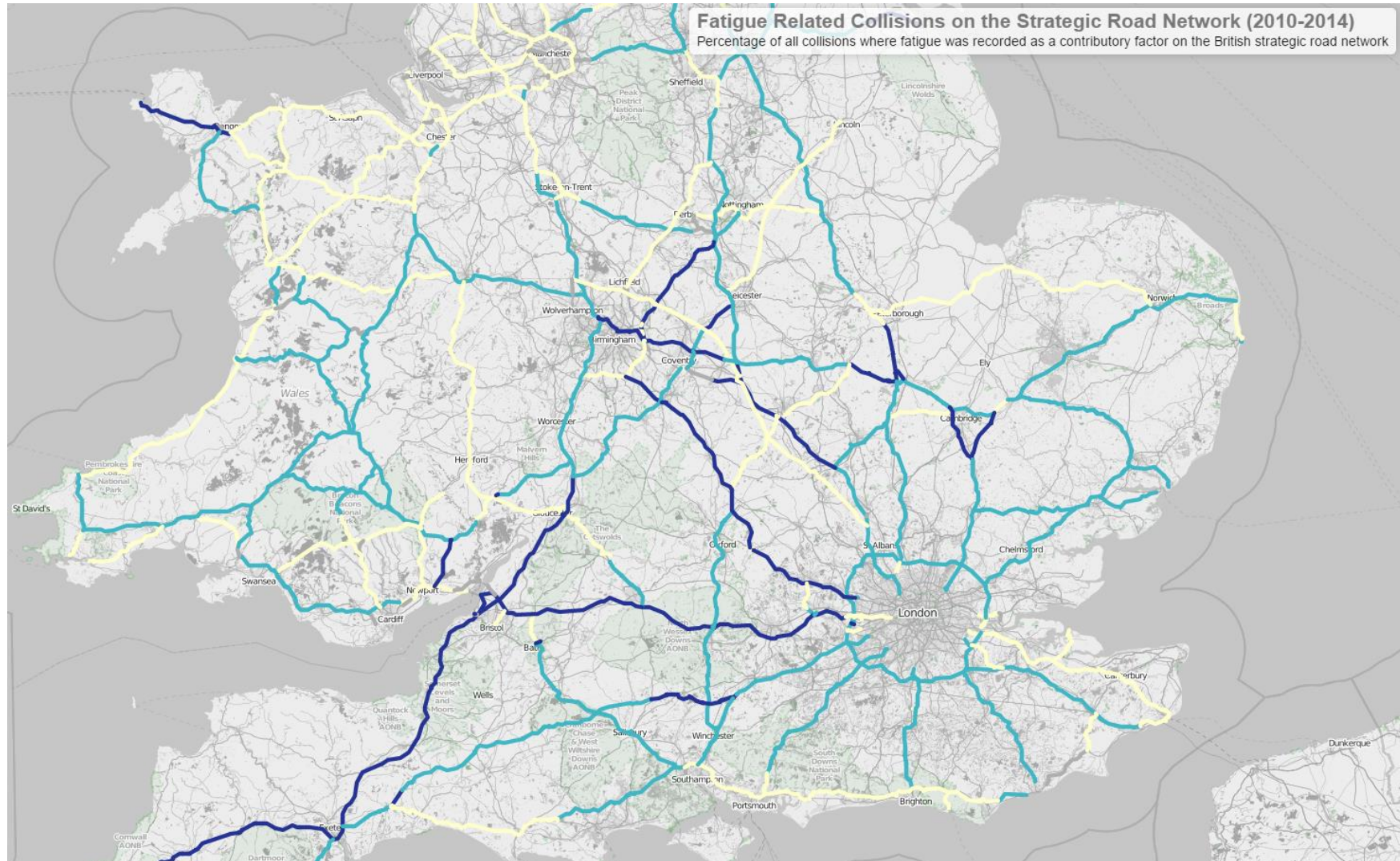


HOTSPOT (BLACKSPOT) IDENTIFICATION



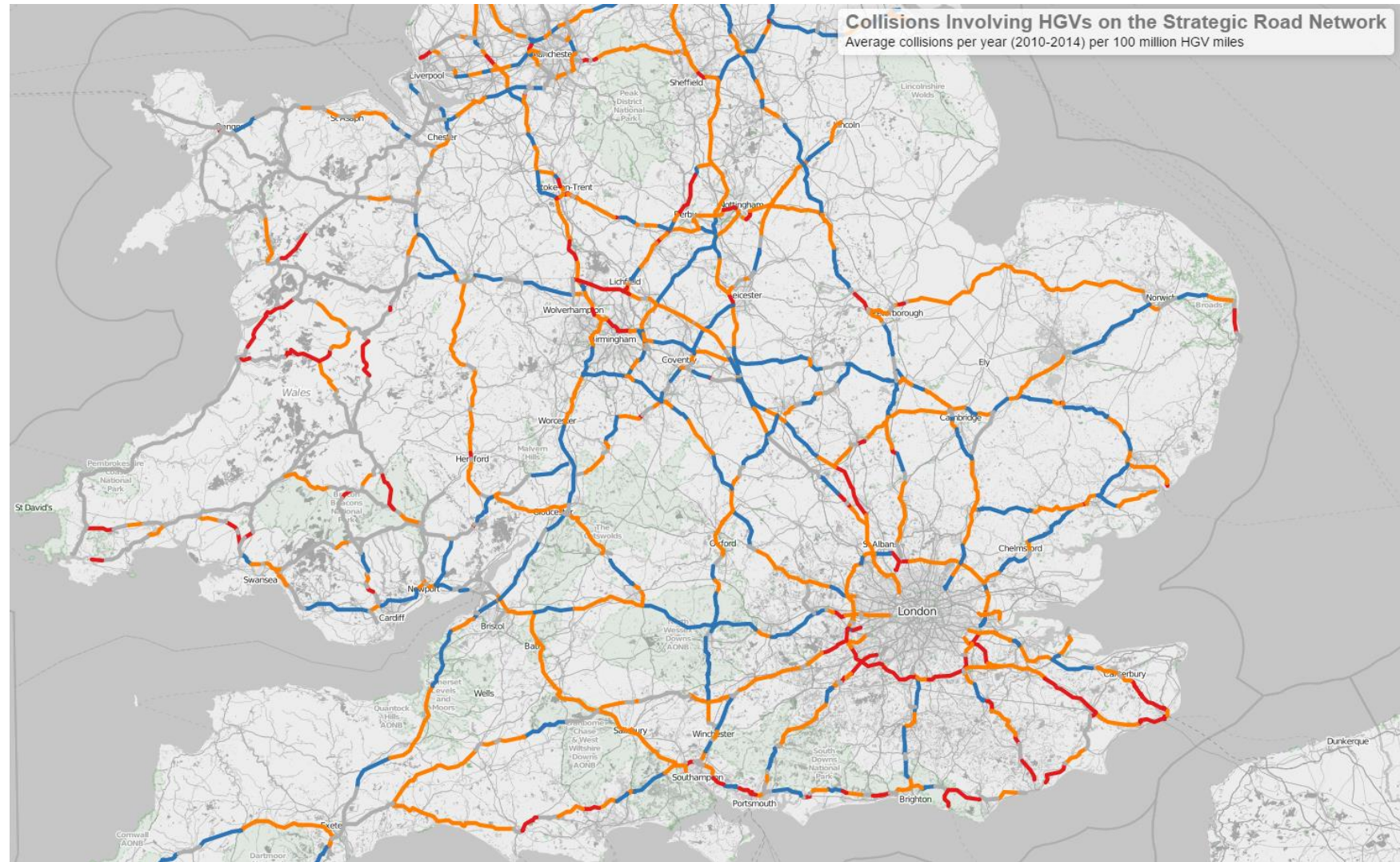


HOTSPOT (BLACKSPOT) IDENTIFICATION





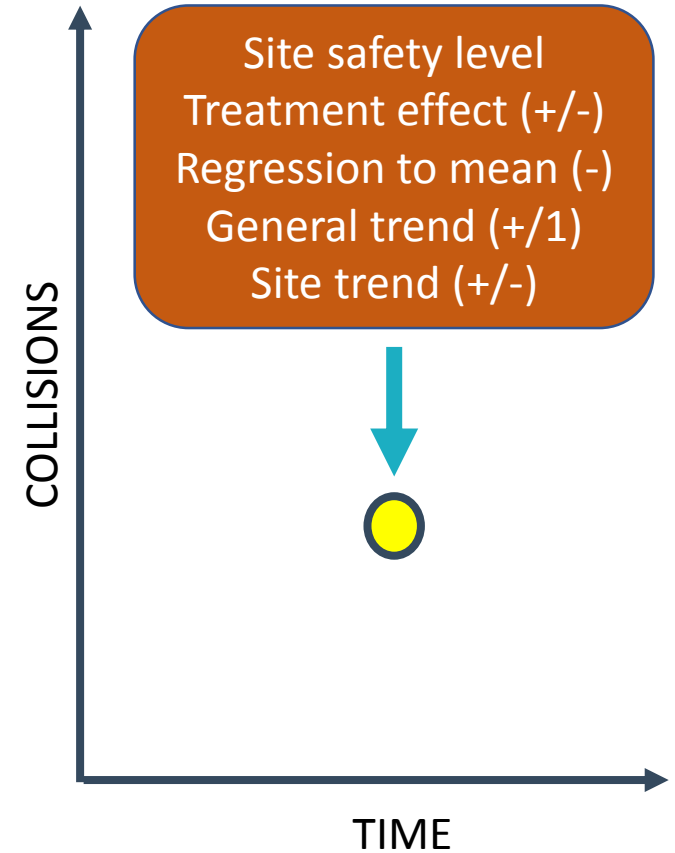
HOTSPOT (BLACKSPOT) IDENTIFICATION





HOTSPOT (BLACKSPOT) IDENTIFICATION

- Issue no.1
 - What we see is not all 'SITE SAFETY - related'
 - There are other factors, some of them captured in trend
 - Regression to Mean is another confounding factor we need to account for
 - How do we account for these?





HOTSPOT (BLACKSPOT) IDENTIFICATION

- A proposed solution: GLM – Generalised Linear Model (works well for analysing the effect of a strategy/ an intervention)
 - Identifies and eliminates from the analyses the SSP (site selection periods – susceptible to RTM)
 - Accounts for trend, taken from a comparative sample (preferably larger)
 - Reveals only the effect of the treatment, when compared to similar sites and eliminating Trend and RTM

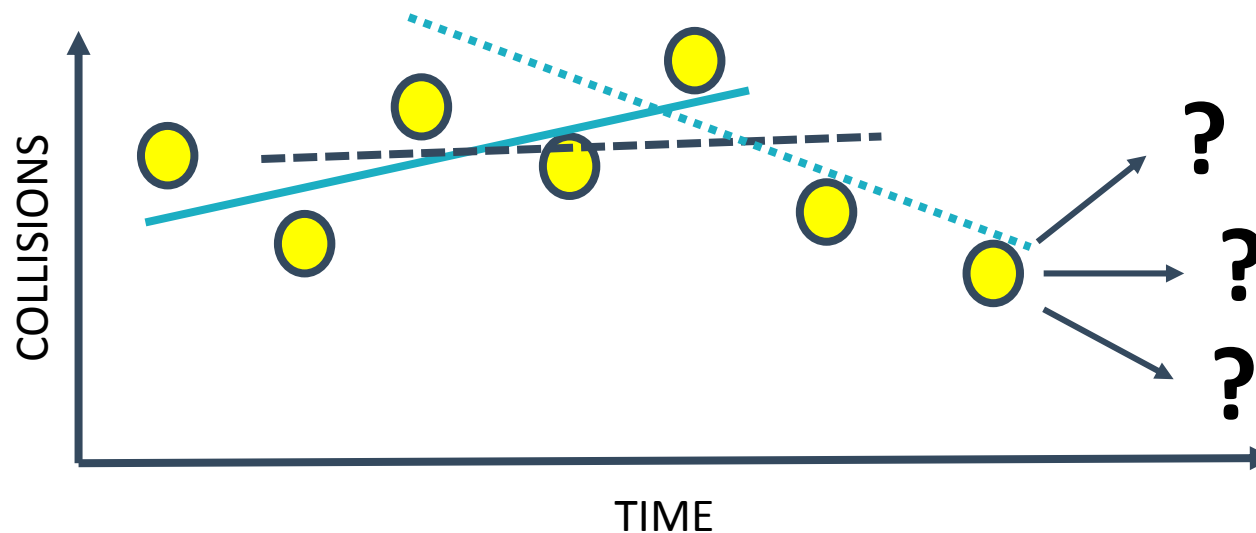


The Effectiveness of
Average Speed Cameras
in Great Britain



HOTSPOT PREDICTION

- Issue no.2
 - Reactive or Proactive?
 - How do we put things in context, account for confounding factors and predict and prevent for the future?





HOTSPOT PREDICTION

- RAPTOR
 - Can do what we can't – put things into context and give us refined predictions that will allow for proactive measures (rather than the usual reactive ones)
 - Developed by a team of academic experts from Newcastle University to help road safety practitioners to understand and predict road collisions on their roads
 - More details on:
 - <http://roadsafetyanalysis.org/raptor/>
 - <https://mas-shiny.ncl.ac.uk/hotspotID/>



PRACTICAL EXAMPLE – WALES MOST DANGEROUS ROADS

- Data used

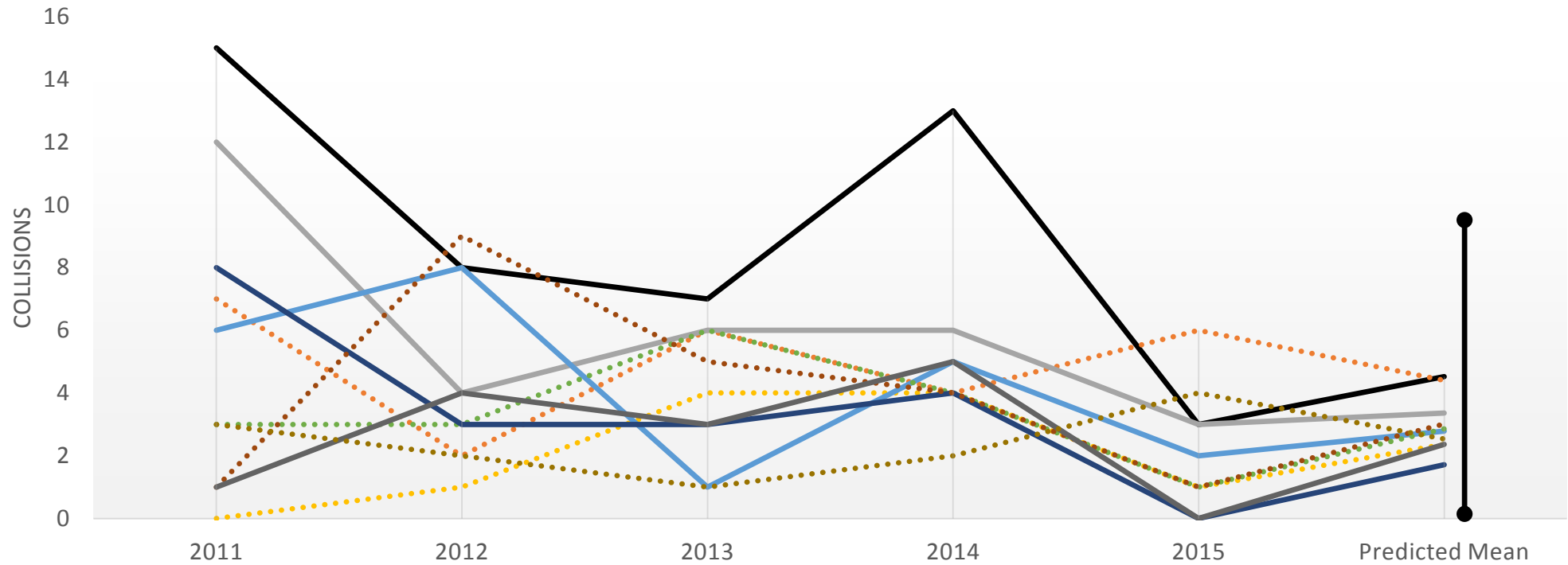
5 years of
individual data
points per site

Comparator data
from 10% of the
other roads
analysed

No supplementary
information
provided



PRACTICAL EXAMPLE – WALES MOST DANGEROUS ROADS



- Site_3547 B5126 to A494 Shotton, Connah's Quay
- Site_3427 Penrhyn Bay to B5116 Llandrillo yn Rhos
- Site_2066 A546 to Pabo Lane, Llandudno Junction
- Site_0785 A546 Llandudno to Bodafon Road, Penrhyn Bay
- Site_0073 A494 to A550 Ewloe to Hawarden
- Site_2086 A494 to A548 Queensferry to Garden City
- Site_2468 A473 to Ffordd Glas Y Dorlan, Beddau
- Site_1445 A550 Hawarden to A5104 Broughton
- Site_2094 M4 J45 to B4291 Clydach
- Site_0226 A4281 to B4560 Rassau/Beaufort



CONCLUSIONS AND DISCUSSIONS

- Why are predictive tools useful?
 - They help us see what we can't see otherwise (significant predictors, important covariables etc.)
 - Account for confounding factors such as trend or RTM
 - Help us identify false positives (sites that can appear as hotspots when they are not – saving resources) and false negatives (not identifying an unsafe site – improve safety)
 - Analyse 'isolated' situations in context
 - Allow for proactive measures



George.Ursachi@agilysis.co.uk
Andrew.Hartley@agilysis.co.uk
Richard.Owen@agilysis.co.uk
Neil.Thorpe@ncl.ac.uk
Lee.Fawcett@ncl.ac.uk

CONTACTS