



# The Role of the Highways and Street Lighting Professional in Making Roads Safer

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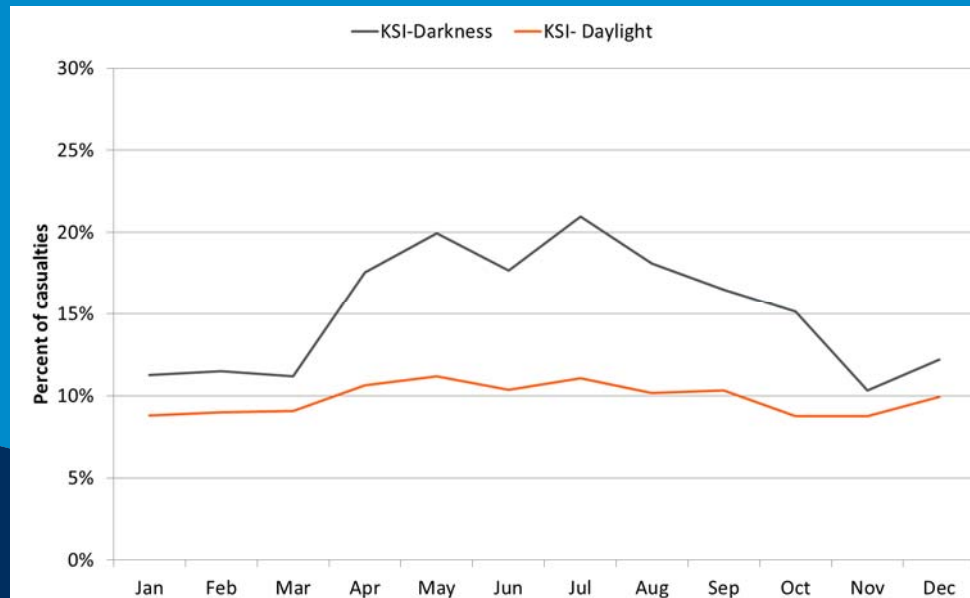
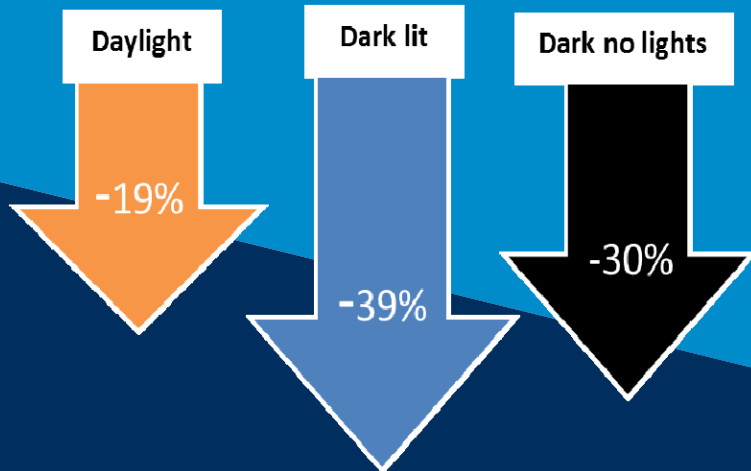
## Safety

Our focus is always on providing a safer network for all road users and reducing the number of casualties

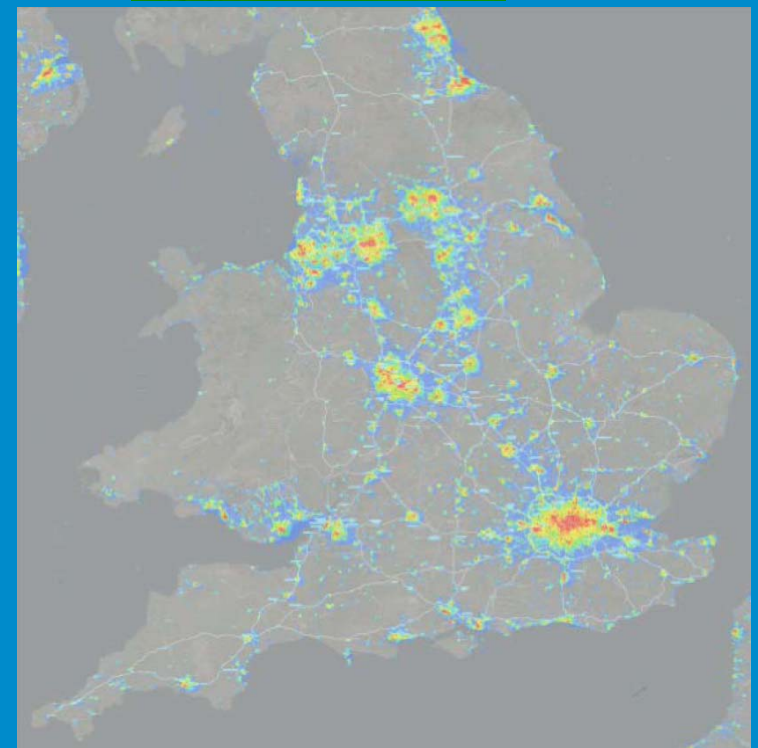
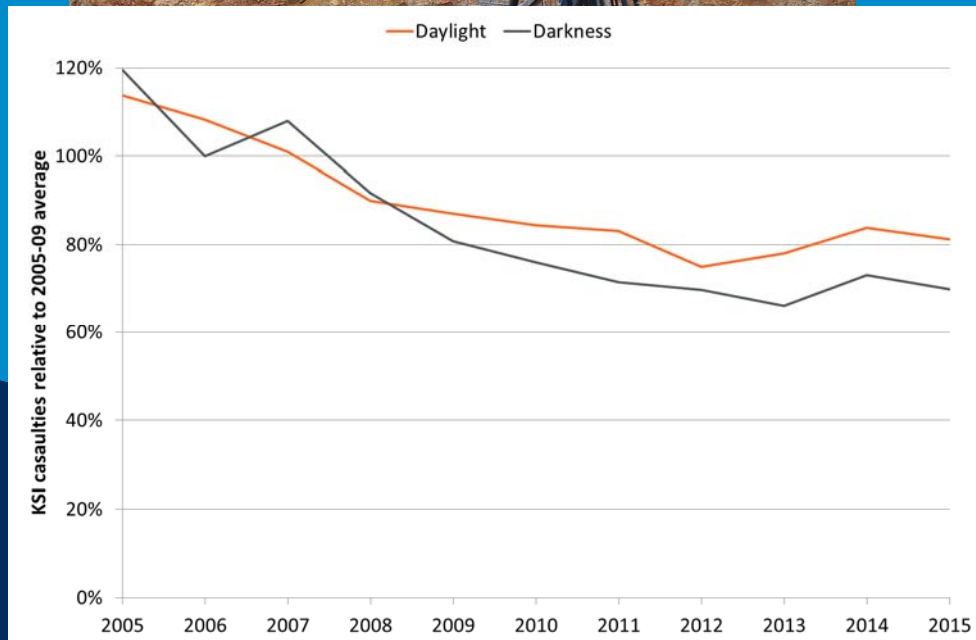


**40%**

Reduction in the number of people **killed or seriously injured** on the network







- Challenging Target
- Not expecting any (big) budget increase
- Old approach is running out of steam
- No new interventions
- Vehicle fleet churn slowing

- **Making the Network safer** by continuing to reduce the number of people killed or seriously injured on the Network. The target of a 40% reduction against the 2005–09 average baseline by the end of 2020 is a stretching one; the Company will need to work **proactively** to find **innovative** ways to improve safety.



TRIZ solution patterns  
And inventive principles

**ABSTRACT  
PROBLEM**



**ABSTRACT  
SOLUTION**



**PROBLEM  
ANALYSIS**



**SPECIFIC  
PROBLEM**

**SPECIFIC  
SOLUTION**

# The Digital Challenge for Highways Management

Nic Cary

Head of Digital Transformation and Open Data  
Department for Transport



## Definition of digital

- It's about ~~digital~~ business transformation...
- What digital is not:
  - a. all about websites
  - b. IT
- What digital is:
  - a. creates and operates services to meet user needs
  - b. adopts new (relevant) ways of solving problems
  - c. drives partnership and collaboration approach to creating value

# GET DATA SHARE DATA USE DATA

- STATS19 (day & night)
- Link speed and flow data
- Road surface condition
- DfT Road Collision in depth studies
- On-scene collision studies
- Highway England Fataals studies
- Link iRAP Highways England Control Centre C&C data
- 'Red' and 'Green' claims

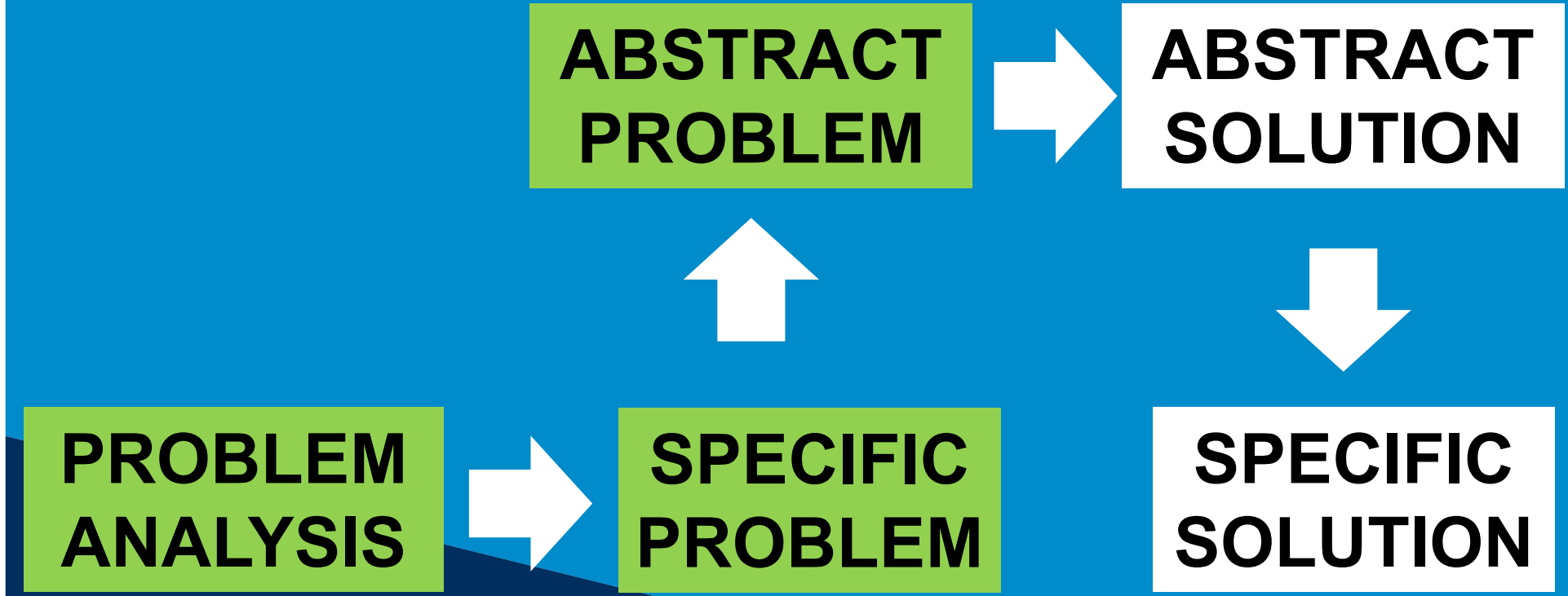


## Areas of interest (high night-time KSI occurrence):

- Pedestrians
- Loss of control type accidents
- Speeding, drinking and fatigue



TRIZ solution patterns  
And inventive principles



Key factor: Pedestrians; Contributory factor: Failed to judge vehicle's path or speed

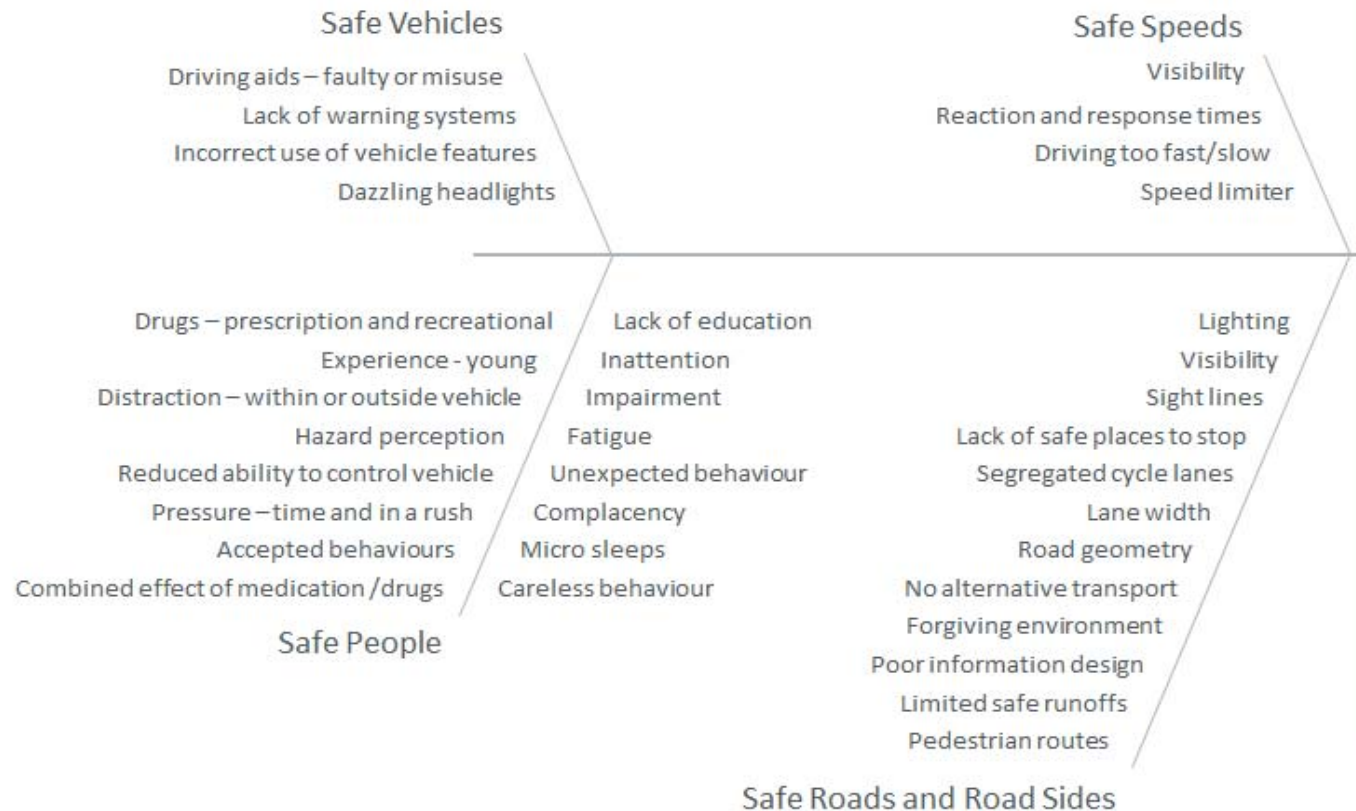
# Ishikawa Diagram

WP420 Identifying Safe System performance gaps

DRAFT



## Cause



## Effect

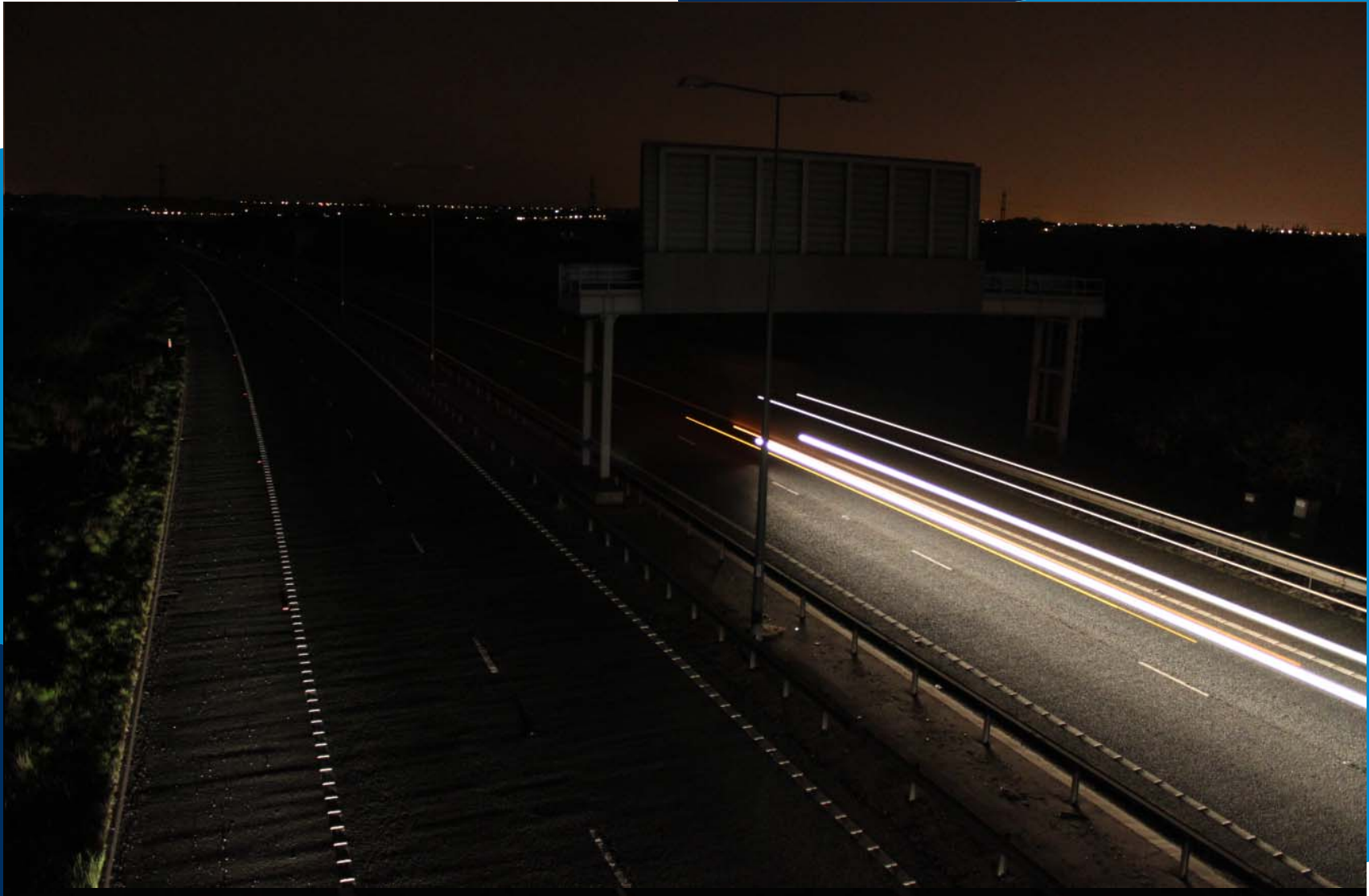
**Dangerous Behaviours**  
**Fatigue**

Driver/ rider was so tired that they could not drive effectively or were unable to perceive hazards.

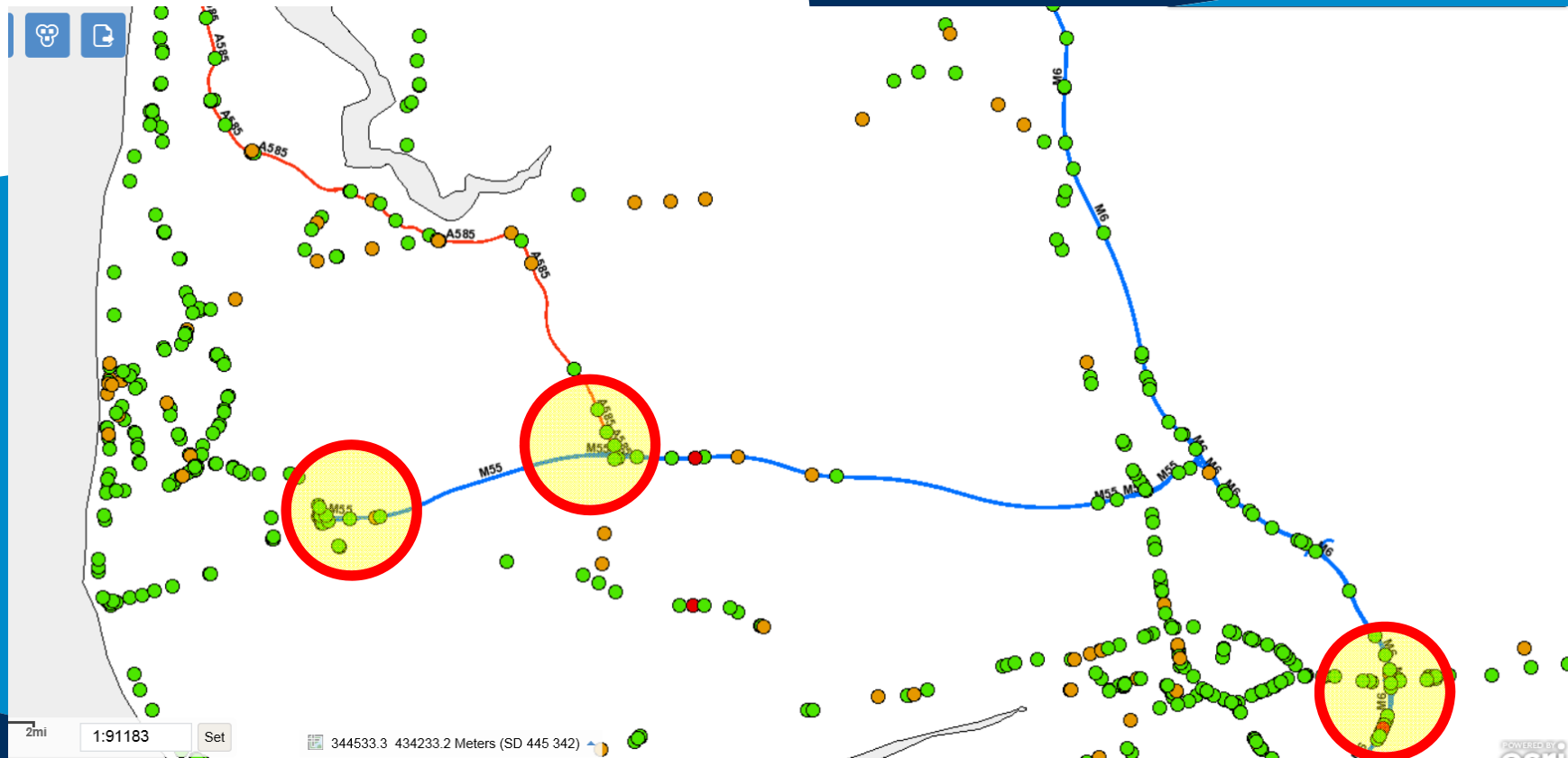
# AVOIDING HIGH RISK SITUATIONS

for  
Road Users





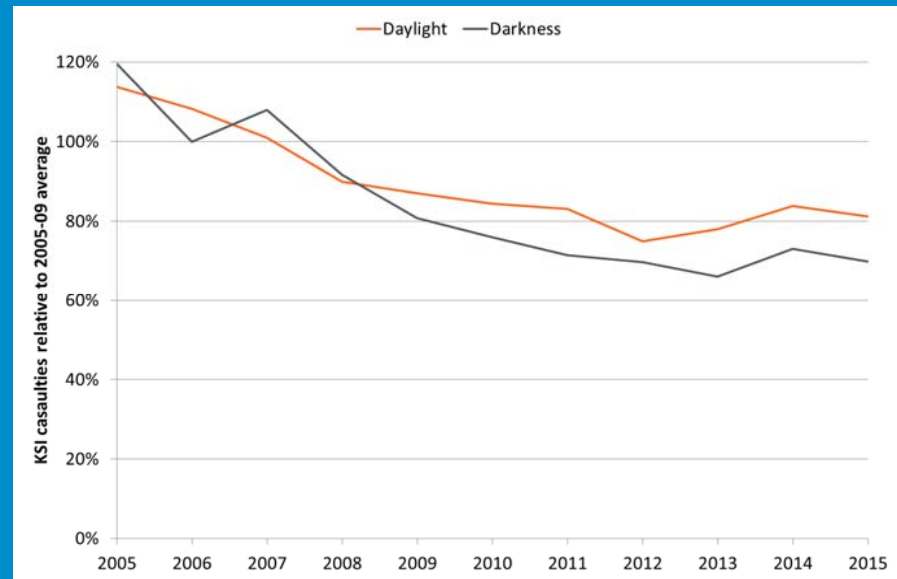




**SPECIFIC  
PROBLEM**

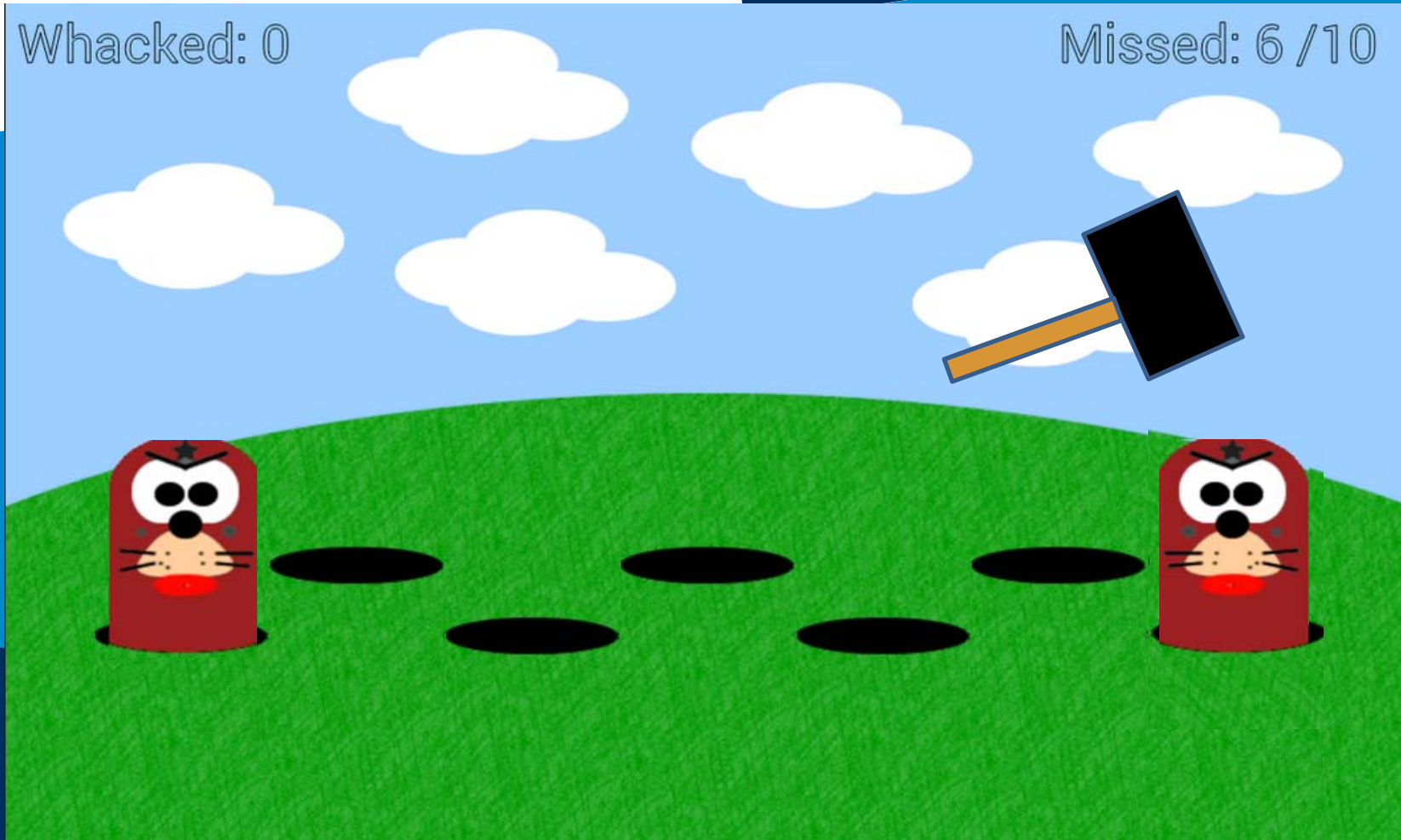






















**SPECIFIC  
SOLUTION**

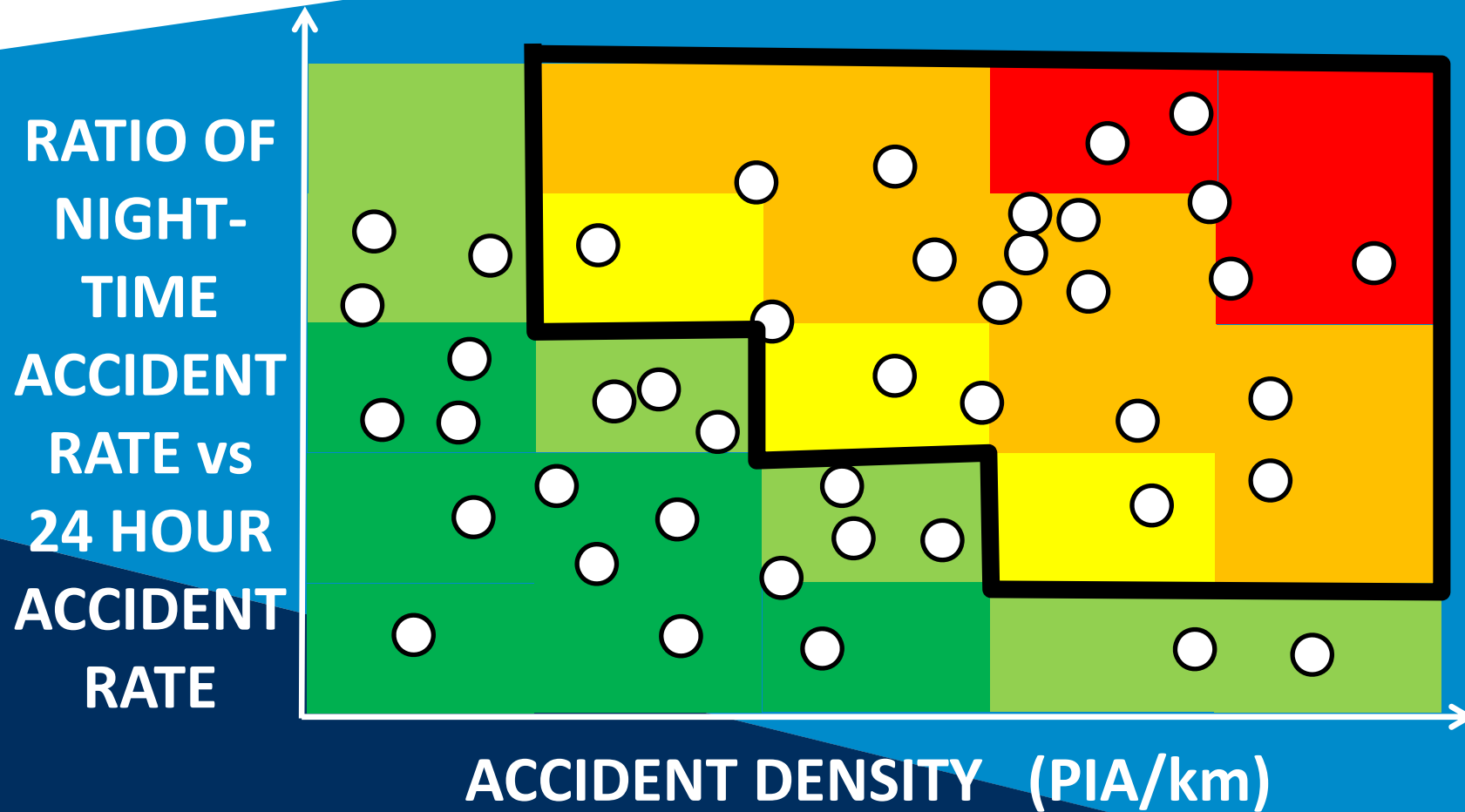


Whacked: 0

Missed: 6 / 10



|  |   |   |  |  |  |   |   |   |   |   |
|--|---|---|--|--|--|---|---|---|---|---|
|  | <b>103</b>  | <b>102</b>  | <b>101</b>   | <b>110</b>   | <b>108</b>   | <b>107</b>  | <b>109</b>  | <b>104</b>  | <b>105</b>                                | <b>106</b>  |
| <b>Road Environment Contributed</b>            | Slippery Road (due to weather)  | Deposit on road (e.g oil, mud, skid marks)  | Poor or defective road surface   | raised or slippery inspection  | (e.g bend, hill, narrow carrageway)  | road layout (e.g contraflow)  |  | or marked signs or road markings  | Defective traffic signals                 | calming (e.g speed cushions,  |
|  | <b>201</b>  | <b>202</b>  | <b>203</b>   | <b>204</b>   | <b>205</b>   | <b>206</b>  |   |   |   |   |
| <b>Vehicle Defects</b>                         |    |    |   |  |   |  |   |   |   |   |
|  | <b>308</b>  | <b>306</b>  | <b>302</b>   | <b>301</b>   | <b>307</b>   | <b>310</b>  | <b>305</b>  | <b>304</b>  | <b>309</b>                                | <b>303</b>  |
| <b>Injudicious Action</b>                      | Following too close   | Exceeding speed limit   | Give Way or Stop signs or markings   | Disobeyed automatic traffic signal   | Travelling too fast for conditions   | entering road from pavement   | Illegal turn or direction of travel   | pedestrian crossing facility  | vehicle travelling along                  | Disobeyed double white lines  |
|  | <b>405</b>  | <b>406</b>  | <b>403</b>   | <b>408</b>   | <b>409</b>   | <b>401</b>  | <b>402</b>  | <b>404</b>  | <b>407</b>                                | <b>410</b>  |
| <b>Driver / Rider Error or Reaction</b>        | Failed to look properly   | Fail to judge other person's path   | poor turn or manoeuvre   | Sudden braking   | Swerved  | Junction overshoot  | restart (moving off at junction)  | signal or misleading signal   | to cyclist, horse or pedestrian           | Loss of control   |
|  | <b>501</b>  | <b>502</b>  | <b>508</b>   | <b>503</b>   | <b>509</b>   | <b>510</b>  | <b>505</b>  | <b>504</b>  | <b>507</b>                                | <b>506</b>  |
| <b>Impairment or Distraction</b>               |    |    |   |  |   | Distraction outside vehicle   |  |  | Rider wearing dark clothing               |    |
|  | <b>602</b>  | <b>605</b>  | <b>601</b>   | <b>603</b>   | <b>607</b>   | <b>606</b>  | <b>604</b>  |   |   |   |
| <b>Behaviour or Inexperience</b>               | Careless, reckless or in a hurry  | Learner or inexperienced driver / rider   |  | Nervous, uncertain or panic  |  | Inexperience of driving on the left   | Driving too slow for conditions or slow vehicle                                     |   |   |   |
|  | <b>701</b>  | <b>703</b>  | <b>706</b>   | <b>707</b>   | <b>708</b>   | <b>705</b>  | <b>710</b>  | <b>702</b>  | <b>704</b>                                | <b>709</b>  |
| <b>Vision Affected by</b>                      | Stationary or parked vehicle(s)   | Road layout (e.g bend, winding road, hill crest)                                    | Dazzling sun   | Rain, sleet, snow or fog   | spray from other vehicles  | Dazzling headlights   | Vehicle blind spot  | vegetation  | Buildings, Road signs, street furniture   |  |
|  | <b>802</b>  | <b>808</b>  | <b>803</b>   | <b>801</b>   | <b>806</b>   | <b>807</b>  | <b>805</b>  | <b>804</b>  | <b>809</b>                                | <b>810</b>  |
| <b>Pedestrian only (Casualty or Uninjured)</b> | Failed to look properly   | Careless, reckless or in a hurry  | Failed to judge vehicle's path or speed  | Crossing road marked by stationary or parked vehicle                               | Impaired by alcohol  | Impaired by drugs (illicit or medicinal)  | Dangerous action in carrageway (e.g playing)  | Wrong use of pedestrian crossing facility   | Pedestrian wearing dark clothing at night | Disability or illness, mental or physical   |
|  | <b>901</b>  | <b>902</b>  | <b>903</b>   | <b>904</b>   |  |   |   |   |   | <b>999</b>  |
| <b>Specials Codes</b>                          |  |  | Emergency vehicle on a call  | vehicle door opened or close   |  |   |   |   |   |   |





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| Scheme Number | PIC per Annum Rate | PIC per MVKM Rate | KSI Ratio |
|---------------|--------------------|-------------------|-----------|
| 2             | +0.9               | +0.90             | -50%      |
| 15            | -1.2               | -0.06             | -10%      |
| 16            | +2.6               | +0.08             | +27%      |
| 17            | -0.1               | +0.01             | -5%       |
| 18            | -1.7               | -0.03             | -22%      |
| 19            | -13.6              | -0.03             | +2%       |
| 20            | -0.9               | -0.10             | -23%      |
| 21            | -6.1               | +0.02             | -11%      |





Table 26: Summary of Impact of Road Lighting Strategy (FSO Schemes)

|                    | SMART MWAY | MOTORWAY   | DUAL CARR  | SINGLE CARR |
|--------------------|------------|------------|------------|-------------|
| ROAD ENVIRONMENT   | <b>26</b>  | <b>-13</b> | <b>-29</b> | <b>-7</b>   |
| VEHICLE DEFECT     | <b>-43</b> | <b>2</b>   | <b>-25</b> | <b>85</b>   |
| INJUDICIOUS ACTION | <b>6</b>   | <b>9</b>   | <b>-13</b> | <b>2</b>    |
| DRIVER ERROR       | <b>9</b>   | <b>-6</b>  | <b>-29</b> | <b>-19</b>  |
| IMPAIRMENT OR DIST | <b>-11</b> | <b>-18</b> | <b>-5</b>  | <b>-18</b>  |
| BEHAVIOUR OR EXP'C | <b>-12</b> | <b>-1</b>  | <b>-19</b> | <b>-11</b>  |
| VISION AFFECTED    | <b>-5</b>  | <b>-8</b>  | <b>-34</b> | <b>-27</b>  |
| PEDESTRIAN ONLY    | <b>-72</b> | <b>-64</b> | <b>-80</b> | <b>-86</b>  |
| SPECIAL CODES      | <b>57</b>  | <b>-22</b> | <b>-6</b>  | <b>-13</b>  |



| Rank | Contributory factor                              | KSI | Killed | Seriously injured | Slightly injured | Total casualties |
|------|--|-----|--------|-------------------|------------------|------------------|
| 1    | 405 Failed to look properly                      | 491 | 47     | 444               | 4,958            | 5,449            |
| 2    | 410 Loss of control                              | 428 | 55     | 373               | 2,167            | 2,595            |
| 3    | 406 Failed to judge other person's path or speed | 389 | 31     | 358               | 4,593            | 4,982            |
| 4    | 602 Careless, reckless or in a hurry             | 247 | 26     | 221               | 1,620            | 1,867            |
| 5    | 403 Poor turn or manoeuvre                       | 191 | 20     | 171               | 1,564            | 1,755            |
| 6    | 503 Fatigue                                      | 169 | 17     | 152               | 759              | 928              |
| 7    | 409 Swerved                                      | 159 | 20     | 139               | 889              | 1,048            |
| 8    | 307 Travelling too fast for conditions           | 148 | 14     | 134               | 1,082            | 1,230            |
| 9    | 408 Sudden braking                               | 125 | 6      | 119               | 1,923            | 2,048            |
| 10   | 306 Exceeding speed limit                        | 111 | 20     | 91                | 375              | 486              |
| 11   | 308 Following too close                          | 109 | 6      | 103               | 2,235            | 2,344            |
| 12   | 505 Illness or disability, mental or physical    | 108 | 15     | 93                | 305              | 413              |
| 13   | 509 Distraction in vehicle                       | 100 | 19     | 81                | 635              | 735              |
| 14   | 501 Impaired by alcohol                          | 100 | 7      | 93                | 351              | 451              |
| 15   | 601 Aggressive driving                           | 62  | 12     | 50                | 289              | 351              |
| 16   | 605 Learner or inexperienced driver/rider        | 51  | 5      | 46                | 379              | 430              |
| 17   | 502 Impaired by drugs (illicit or medicinal)     | 36  | 9      | 27                | 64               | 100              |
| 18   | 510 Distraction outside vehicle                  | 29  | 3      | 26                | 261              | 290              |
| 19   | 401 Junction overshoot                           | 25  | 1      | 24                | 147              | 172              |
| 20   | 404 Failed to signal or misleading signal        | 22  | 1      | 21                | 140              | 162              |

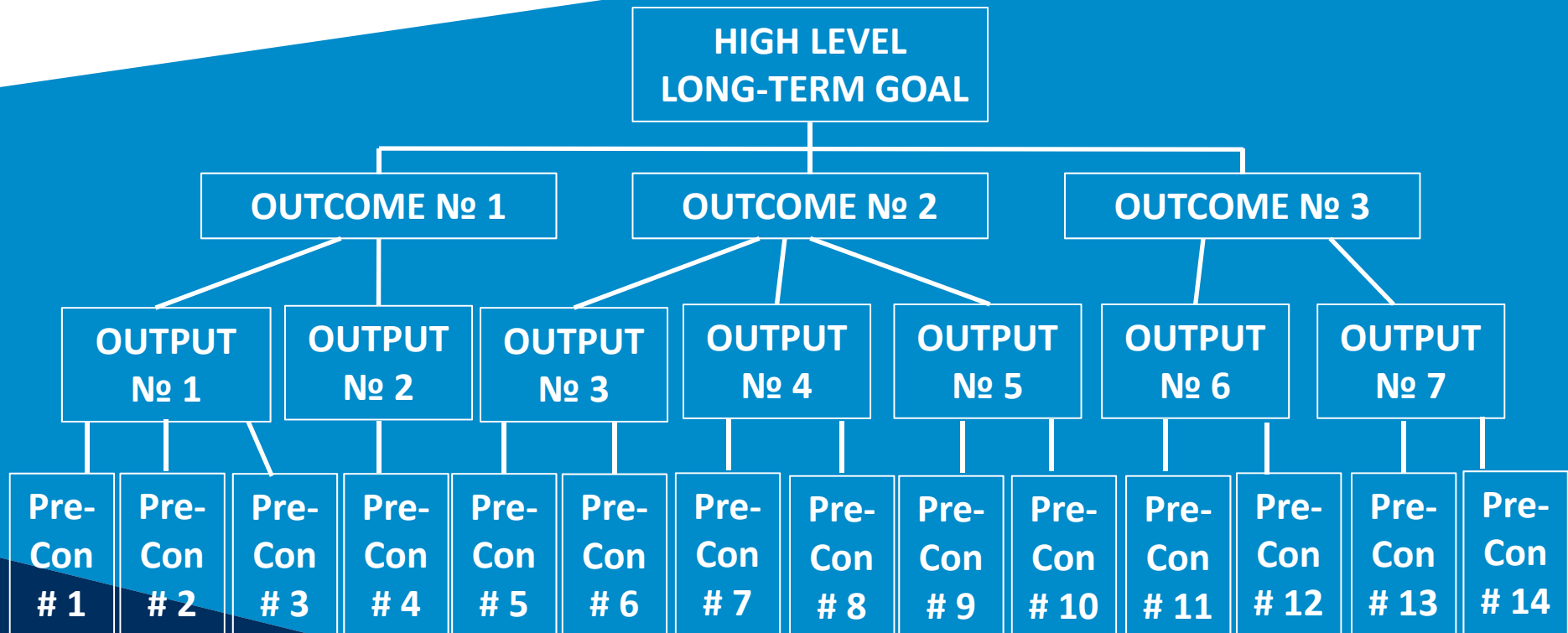
Key (CF groups):

|   |                                |  |                           |   |                    |
|---|--------------------------------|--|---------------------------|---|--------------------|
|  | Driver/Rider error or reaction |  | Impairment or distraction |  | Injudicious action |
|  | Behaviour or inexperience      |  |                           |   |                    |

|                    | SMART MWAY | MOTORWAY | DUAL CARR | SINGLE CARR |
|--------------------|------------|----------|-----------|-------------|
| ROAD ENVIRONMENT   | 26         | -13      | -29       | -7          |
| VEHICLE DEFECT     | -43        | 2        | -25       | 85          |
| INJUDICIOUS ACTION | 6          | 9        | -13       | 2           |
| DRIVER ERROR       | 9          | -6       | -29       | -19         |
| IMPAIRMENT OR DIST | -11        | -18      | -5        | -18         |
| BEHAVIOUR OR EXP'C | -12        | -1       | -19       | -11         |
| VISION AFFECTED    | -5         | -8       | -34       | -27         |
| PEDESTRIAN ONLY    | -72        | -64      | -80       | -86         |
| SPECIAL CODES      | 57         | -22      | -6        | -13         |

|                    | SMART MWAY | MOTORWAY | DUAL CARR | SINGLE CARR |   |     |     |     |     |     |     |     |     |     |     |
|--------------------|------------|----------|-----------|-------------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ROAD ENVIRONMENT   | 26         | -13      | -29       | -7          | Road Environment Contributed            | 103 | 102 | 101 | 110 | 108 | 107 | 109 | 104 | 105 | 106 |
| VEHICLE DEFECT     | -43        | 2        | -25       | 85          | Vehicle Defects                         | 201 | 202 | 203 | 204 | 205 | 206 |     |     |     |     |
| INJUDICIOUS ACTION | 6          | 9        | -13       | 2           | Injudicious Action                      | 308 | 306 | 302 | 301 | 307 | 310 | 305 | 304 | 309 | 303 |
| DRIVER ERROR       | 9          | -6       | -29       | -19         | Driver / Rider Error or Reaction        | 405 | 406 | 403 | 408 | 409 | 401 | 402 | 404 | 407 | 410 |
| IMPAIRMENT OR DIST | -11        | -18      | -5        | -18         | Impairment or Distraction               | 501 | 502 | 508 | 503 | 509 | 510 | 505 | 504 | 507 | 506 |
| BEHAVIOUR OR EXP'C | -12        | -1       | -19       | -11         | Behaviour or Inexperience               | 602 | 605 | 601 | 603 | 607 | 606 | 604 |     |     |     |
| VISION AFFECTED    | -5         | -8       | -34       | -27         | Vision Affected by                      | 701 | 703 | 706 | 707 | 708 | 705 | 710 | 702 | 704 | 709 |
| PEDESTRIAN ONLY    | -72        | -64      | -80       | -86         | Pedestrian only (Casualty or Uninjured) | 802 | 808 | 803 | 801 | 806 | 807 | 805 | 804 | 809 | 810 |
| SPECIAL CODES      | 57         | -22      | -6        | -13         | Specials Codes                          | 901 | 902 | 903 | 904 |     |     |     |     |     | 999 |

# The Theory of Change



# SAFE ROADS

## ROAD LIGHTING

STATS19 FACTOR

ROAD TYPE

SPATIALLY SPECIFIC

## ACTIVE ROAD STUDS

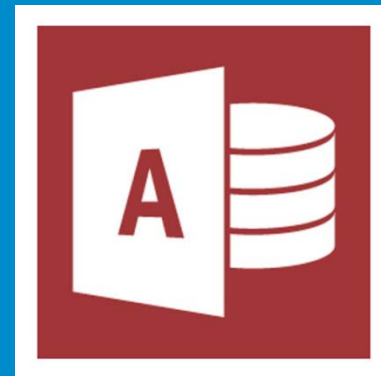
STATS19 FACTOR

CREST OF HILL

SPATIALLY SPECIFIC

# SCHEME COSTS

STATS19  
DATA



ROAD  
LIGHTING

STATS19 FACTOR

ROAD TYPE

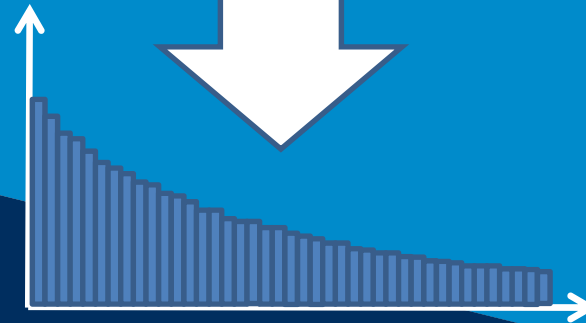
SPATIALLY SPECIFIC

ACTIVE  
ROAD STUDS

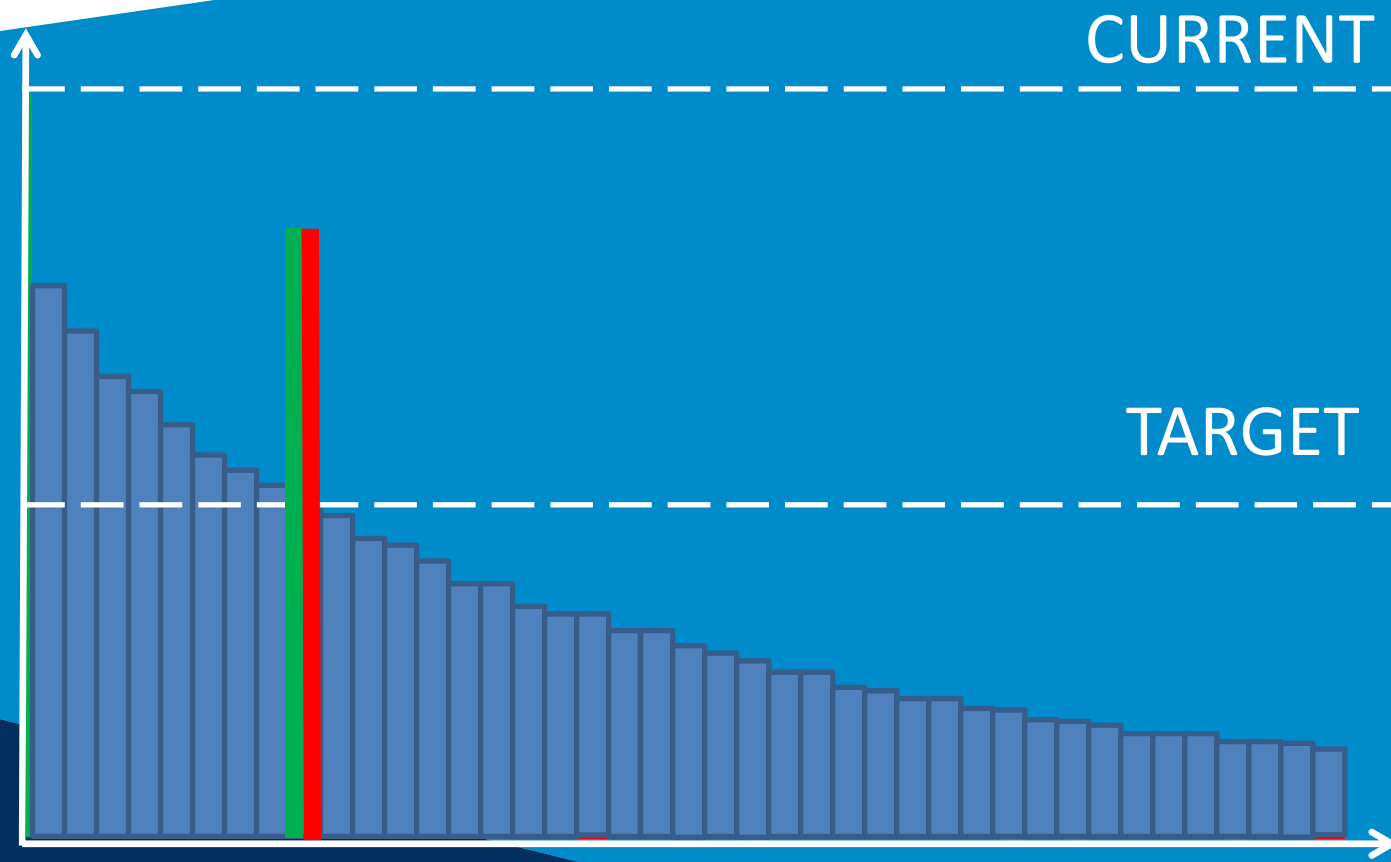
STATS19 FACTOR

CREST OF HILL

SPATIALLY SPECIFIC



N  
E  
T  
W  
O  
R  
K



CUMULATIVE PROGRAMME COST

ROAD USERS  
HIGHWAY DESIGN

BIG  
DATA

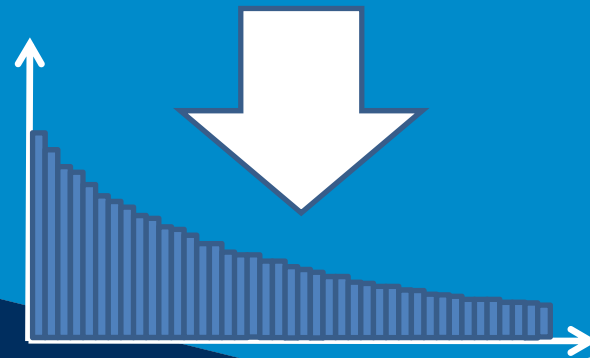


INFO

INFO



- ROAD LIGHTING
- STATS19 FACTOR
- ROAD TYPE
- SPATIALLY SPECIFIC
- COSTS





# THANK YOU

