

# Developing and Measuring Safety Performance Indicators at Sub-National Level

*Roundtables Summary Report*



Road Safety **GB**

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# EXECUTIVE SUMMARY

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## ABOUT ROAD SAFETY GB'S SUPPORT FOR ROAD SAFETY ANALYSTS

Road Safety GB (RSGB), with support from the Department for Transport, has provided a number of professional development, networking, and research outputs for the last five years. This included the annual 'Joining the Dots' conference, a regional 'Champions Network' with support for local events, plus resources, webinars and reports to help those who work in the sector.

Increasingly, focus has moved away from simply reviewing historic data such as STATS19, and there is growing interest in accessing other information to help explain and demonstrate the levels of safety on our road network. The topic of Safety Performance Indicators has attracted international attention, as well as within the UK, and this roundtable was commissioned to help understand more about this area, and the role of government and local authorities in developing and measuring them.

To assist its members and the wider road safety profession, RSGB Research Director Matt Staton, together with the team at Agilysis, agreed the outline of a series of roundtable events which would bring together those who are actively working in this area. This report is the summary output of those two events.

## THE CONTEXT FOR SAFETY PERFORMANCE INDICATORS

There is a movement across many devolved or local authorities in the UK to create Safe System or Vision Zero strategies, most notably with the introduction of Scotland's Road Safety Framework to 2030, launched in February 2021, but also in several English local authorities or road safety partnerships. These strategy documents typically have a commitment towards zero fatal and serious collisions on top of interim targets for casualty reduction e.g., 50 by 30. Another critical element of these commitments is the measurement of Safety Performance Indicators (SPIs or KPIs) for assessing the intrinsic level of safety linked to specific safe system elements e.g., Safer Roads and Roadsides.

High-level recommendations for the UK have been put forward by PACTS (Anderson, 2018), however, international experience in this area is ahead of the UK, with countries such as Sweden (Lindberg, 2019), Norway (IRTAD, 2021) and Ireland (Road Safety Authority, 2021) having set national SPIs in support of Vision Zero strategies, and an EU project to develop methodology for SPIs across the member states (Vias Institute, 2022).

The challenge in the UK is that much of this work is being developed at a sub-national level, where differences in priorities, resources and existing practices are likely to introduce issues with comparability and consistency should SPI data be collated at a national level in the future. From a practical perspective, it is also important that the SPIs adopted by authorities encourage the most effective casualty reduction interventions to direct the limited resources available and achieve the ambitious targets being adopted. The aim of the roundtable events summarised here is to support the navigation of these challenges and look towards the development of a framework for safety performance indicators relevant at local, regional, and national levels.

## THE ROUNDTABLE PROCESS

This report summarises the content that was delivered, and, just as importantly, the discussions and insights generated from two, one-day roundtable events organised with the purpose of bringing together a range of policy experts, technology providers, NGOs, and representatives from the UK public sector who are already engaged in this area. The aim of these events is to maintain momentum in this area of road safety monitoring, by informing SPI development and collaboration dynamics across all relevant organisations and stakeholders.

Understanding the options for the creation and measurement of SPIs at a sub-national level is the focus of two roundtable events which took place on 7<sup>th</sup> February and 22<sup>nd</sup> April 2022. Together these events have formed a key part of the RSGB Analysts Support delivery led by Agilysis.

The events involved contributions from many participants from different backgrounds, sectors, and countries.

## SUMMARY AND RECOMMENDATIONS

The first roundtable considered the state of readiness for SPI use at both a national and local level. Safety performance indicators were defined as measuring “the operational conditions of all aspects of the road traffic system, which influence safety performance.” Local authorities are in different positions in terms of indicator development and practical use. A clear distinction was identified between those Safe System indicators which are manageable on a local level, and those which require national direction and facilitation. This focus on the practical employment of SPIs was a consistent reference point of discussion throughout the events. The use of SPIs by responsible road safety stakeholders is considered to be a politically acceptable way of measuring output; a proactive monitoring approach to reduce fatal and serious injury outcomes. There is therefore considerable interest in support and guidance for their development. SPIs can be used to measure intervention efficacy, and the implementation of solutions which are known to be effective countermeasures against stagnating road safety performance.

The second roundtable considered the use of new data sources to maximise the scope and applicability of SPIs. This included reference to developments in artificial intelligence (AI) and machine learning (predictive) methods to systematically map road network risk, speed, and infrastructure dynamics. Key themes present throughout the event were the diversification of existing data sources; the collaborative efforts required between road safety stakeholders and data holders to maximise development; data accessibility; and accountability mechanisms moving forward. Overall, the activities that took place across the roundtable events suggest that:

1	Road safety stakeholders and local authorities should develop safety performance indicators as they provide a platform for proactive assessment of outputs relating to performance and intervention efficacy across the Safe System	
	Safe Road Use	<p>Identify a standard set of questions that can be used in local road user surveys to monitor safe road use SPIs around alcohol and drug use, handheld device use and seatbelt use as a minimum. These should be published alongside guidance on possible sampling methods depending on the resources available.</p> <p><b>Road Safety GB commit to taking this recommendation forward during 2022/23.</b></p>
	Safe Roads	<p>Existing SPIs for % travel on 3* roads or above for the SRN should be extended to the MRN and considered for 75% travel in each local authority area.</p> <p>National guidance should be developed for assessing the safety of urban roads for VRUs based on infrastructure and speed criteria and used to develop SPIs based on the % of urban roads that meet these criteria.</p>
	Safe Vehicles	National SPIs should be developed for both vehicle technology and vehicle safety ratings (NCAP) for new vehicles sold in the UK. Data on regional variations should be made available to support promotion activity around vehicle safety.
	Safe Speed	<p>Identify criteria for what constitutes a safe speed on different types of roads within the UK road hierarchy, aligned to design guidance. This will enable SPIs on % road that meets these criteria and % traffic complying with the safe speed limits to be established.</p> <p>National guidance on sampling methods to monitor network-wide speeds should be developed to support local authorities in providing consistent and comparable data.</p>
	Post Collision Response	A detailed evidence review is required to determine the most appropriate SPIs in this area, including emergency response, treatment, and victim support.
2	Selected SPIs must have demonstrable connections to targeted reductions in fatal and serious injuries	
3	Efforts must be maintained in advocating for national frameworks and strategic direction, where clearly this is needed to incentivise SPI development consistently between areas.	

4	Responsible stakeholders and authorities should share best practice and contribute to research-led outputs which help to build the evidence base
5	Data collection systems and their scope should be assessed as part of strategic road safety auditing. Where appropriate, stakeholders should seize the opportunity to expand the data underpinning indicators and consider the development of new indicators
6	Efforts must be sustained to overcome the issue of data accessibility, by building collaborative relations with technology providers and communicating the road safety case for indicators with the private sector more generally.
7	Data governance frameworks need to be reviewed as to ensure that whilst privacy protections are complied with, the need to overcome data disparities is also met.

This work is possible thanks to funding received by RSGB from DfT, which is part of an annual grant to support greater sharing of best practice and understanding in the field of road safety analysis and research, and through the engagement of the following stakeholders who participated in the roundtable discussions:

Attendee	Organisation	Event 1	Event 2
<b>Matt Staton (Chair)</b>	RSGB	✓	✓
<b>Richard Owen (Chair)</b>	Agilysis	✓	✓
<b>Wouter Van den Berghe (presenter)</b>	Vias Institute	✓	✓
<b>Pete Thomas (presenter)</b>	Loughborough University	✓	✓
<b>Bart Volckaert (presenter)</b>	TomTom	✗	✓
<b>Dr Apostolos Ziakopoulos (presenter)</b>	National Technical University of Athens	✗	✓
<b>Steve Birdsall (presenter)</b>	GAIST	✗	✓
<b>Peter Mildon (presenter)</b>	Vivacity	✗	✓
<b>Robin Workman (presenter)</b>	TRL	✗	✓
<b>Jonathan Clark (presenter)</b>	TRL	✗	✓
<b>Jeanne Breen</b>	Jeanne Breen Consulting	✓	✗
<b>Katherine Williamson</b>	Department for Transport	✓	✓
<b>Bertrand Deiss</b>	Transport Scotland	✓	✓
<b>Jamie Hassall</b>	National Highways	✓	✓
<b>Kate Honey</b>	National Highways	✓	✓
<b>Hannah Gregory</b>	National Highways	✓	✗
<b>Laura Blundell</b>	National Highways	✓	✗
<b>Laura Green</b>	National Highways	✗	✓
<b>Amelia Kirwan</b>	National Highways	✗	✓

<b>Nicola Foster</b>	Safer Essex Roads Partnership	✓	✗
<b>Will Cubbin</b>	Safer Essex Roads Partnership	✓	✓
<b>Ian Henderson</b>	Safer Essex Roads Partnership	✓	✗
<b>Paul Copeland</b>	ADEPT	✓	✓
<b>David Davies</b>	PACTS	✓	✗
<b>Margaret Winchcomb</b>	PACTS	✓	✗
<b>Garry Palmer</b>	Warwickshire Road Safety Partnership	✓	✓
<b>Sam Hansen</b>	Warwickshire Road Safety Partnership	✓	✗
<b>Philippa Young</b>	Warwickshire Road Safety Partnership	✓	✗
<b>Fay Wileman</b>	Warwickshire Road Safety Partnership	✗	✓
<b>Stewart Fowler</b>	Kent County Council	✓	✓
<b>Rory McMullan</b>	Kent County Council	✓	✗
<b>John Clewer</b>	Vision Zero South West	✓	✗
<b>Ian Fidler</b>	Vision Zero South West	✓	✓
<b>Marie Woltman</b>	Vision Zero South West	✓	✗
<b>Mike Jones</b>	Vision Zero South West	✓	✗
<b>James Anstee</b>	Vision Zero South West	✓	✗
<b>Emily Dunford</b>	Cornwall Council	✗	✓
<b>Teresa Ciano</b>	GoSafe Wales	✓	✗
<b>John Fletcher</b>	TRL	✓	✓
<b>Jo Hammond</b>	TRL	✗	✓
<b>James Bradford</b>	iRAP	✓	✓
<b>Kate Fuller</b>	Road Safety Foundation	✓	✓
<b>Ryan Wibberley</b>	Vivacity	✗	✓
<b>Scott Stephenson</b>	AECOM	✗	✓
<b>Nick Reed</b>	Reed-Mobility	✗	✓
<b>Tanya Fosdick (facilitator)</b>	Agilysis	✓	✓
<b>Dan Campsall (facilitator)</b>	Agilysis	✓	✓
<b>Dr Craig Smith (presenter)</b>	Agilysis	✗	✓
<b>Samuel Scott (note-taker)</b>	Agilysis	✓	✓
<b>Momina Kamran (note-taker)</b>	Agilysis	✓	✓
<b>Caroline Land</b>	Agilysis	✗	✓

## ROUNDTABLE OBJECTIVES

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This summary report shares the findings from two roundtable events, held virtually (via Microsoft Teams) on 7<sup>th</sup> February and 22<sup>nd</sup> April 2022.

The first roundtable event sought to identify:

- What international evidence is there for the setting of Safe System SPIs?
- Where have SPIs been created already in Great Britain?
- What is the current state of readiness for assessment for individual SPIs?

The second roundtable event sought to build upon these points and broaden SPI engagement into the following areas:

- A deep dive into the road infrastructure SPI
- What role can AI and new data sources provide in informing SPIs?
- What would a national best practice guide look like for partnership and authorities in GB?

This report combines the content and output from both roundtable events, and presents the generated discussions across the constituent areas of the Safe System. This aligns with best practice and allows for those who wish to build upon the roundtables' output to identify and understand both the level and nature of SPI engagement across each Safe System development area. The delivery of the roundtables' contents and the discussions generated were developed in an iterative manner. It is therefore important that the findings are presented in a way that encourages road safety stakeholders to continue the conversation around SPI development; engage with the prevailing problems and solutions; and to be inspired by the efforts highlighted over the course of the events themselves. Whilst this approach reflects the level of engagement from both presenters, facilitators, and contributors alike, this summary report should be read as part of ongoing work by numerous stakeholders in ensuring SPI developments directly contribute to targeted reductions in fatal and serious injuries everywhere.

## PRESENTATION SYNOPSES

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### FIRST ROUNDTABLE

The following presentations formed part of the first roundtable, having each focused in some capacity on SPI formulation and adoption, highlighting the importance of measuring operational safety (not just behaviour or infrastructure) but measuring the whole system management. They demonstrated the benefits of comparisons between regions and countries and bringing together the efforts of all the actors involved. By measuring SPIs, it is possible to determine the current level of safety and provides a focus of what needs to be further improved. As a starting point for a road safety strategy, SPIs provide an operational focus and make stakeholders responsible for achieving their goals. They also facilitate multi-sectoral activity.

**Road Safety strategies and Safety Performance Indicators (Pete Thomas, Loughborough University, and Jeanne Breen, Jeanne Breen Consulting):**

*This presentation was the first of several which considered current experiences and case studies surrounding SPI development. This commenced with a look at recent work undertaken to formulate the Irish Road Safety Strategy and the creation of fifteen SPIs, each linked to actions which address intermediate outcomes related to deaths and serious injuries. The rationale and need for SPIs was defined in their capacity to:*

- *Allow for the assessment of current safety conditions of road traffic systems in a comparative manner.*
- *Assist in the selection of the most effective road safety measures as indicators of the level of influence of various interventions.*
- *Act as a tool to relate road safety output to road safety outcomes (reductions in KSIs) and account for random fluctuations in casualty figures.*
- *Act as an incentive to focus the efforts of road safety stakeholders on the evidence-base in a more granular way.*

**Baseline Project – European Union (Wouter Van der Berghe, Vias Institute)**

The second presentation of the first roundtable event presented some of the findings from an EU-wide initiative aimed at encouraging member states, delivered by the project director.

Baseline is a European Union initiative to encourage member states to develop national key performance indicators which has recently been published. The project uncovered some of the challenges which emerge when nations develop their own SPIs; methodological differences can make comparisons difficult. This led to some of the fundamentals needed to adopt a common methodological approach being brought forward. These included the establishment of SPI Expert Groups and technical committees; the creation of a common framework for collecting data for SPI estimation; and the drafting of methodological guidelines for each SPI. The project is assessing the comparability and usefulness of SPIs for assessing road safety performance between countries and will create guidelines for each SPI with examples of their use in practice. Methodological considerations outlined were:

- SPI development processes must include diagnosis of specific safety problems; a focus on canvassing relevant interventions; setting out how it is measured; and formulation of outcome.
- SPI timeframes and geographic scopes must be clearly defined.
- SPI setting must consider questions of exposure, distance travelled, and subject matter (who and what is the focus; groups of casualties or risk factors)
- SPI development processes must include diagnosis of specific safety problems; a focus on canvassing relevant interventions; setting out how it is measured; and formulation of outcome.
- SPI timeframes and geographic scopes must be clearly defined.
- SPI setting must consider questions of exposure, distance travelled, and subject matter (who and what is the focus; groups of casualties or risk factors)

### **Transport Scotland's Road Safety Framework to 2030 (Bertrand Deiss, Transport Scotland)**

This presentation addressed the role of SPIs in the development of a national road safety framework for Scotland. The key focus was on how SPIs synergised with the framework's hierarchy of measures and metrics; long-term goal for road safety performance; associated interim casualty reduction targets; and intermediate sub-targets. The SPIs included in the strategy were included on the basis that they:

- Directly relate to the target objective of reducing KSIs.
- Have a basis in readily available data
- Can be quantitatively and periodically measured
- Have a high level of accuracy and understandability
- Can be demonstrated to be cost effective
- Directly address the needs of all road users

### **Lead Safety Indicators, (Kate Honey and Jamie Hassall, National Highways)**

This presentation focused on the creation of 'lead indicators' in collaboration with TRL, an approach which brings SPI development into the field of relative risk related to specific outputs and the predication of future road network collision dynamics. This was presented as a break from traditional indicators used which focus instead on monitoring historic casualty performance - otherwise known as lag indicators. Whilst it was pointed out that the technicalities surrounding lead indicators may cause confusion for members of the public, their rationale is about galvanising commitment to actions that are already understood to be effective given that are directly related to casualty reduction. Examples of lead indicators either used or in development included:

- Seat belt wearing rates (predicating the effects of increased compliance)
- Speed (predicting the effects of increased compliance)
- Road design (predicting the effects of road infrastructure development)
- Vehicle maintenance (predicting the effects of vehicle

### **SPI Case Study, (Matt Staton, Cambridgeshire & Peterborough Vision Zero Partnership)**

This presentation featured SPI usage and challenges of adoption from the perspective of road safety partnership working. This Vision Zero collaboration partnership stated how whilst they have actively adopted a number of safety performance indicators put forward by PACTS, they are still at an early stage of development in trying to determine how to collect data and measure progress towards selected SPIs. The use of SPIs alongside their other road safety measurement solutions was explained as part of the rationale for adopting the recommended indicators:

- Speed-related SPIs are helping the partnership to assess progress towards Vision Zero imperatives
- Speed SPIs relating the compliance can be monitored using Agilysis' Speed Compliance Dashboard
- SPIs provide a point of cross-reference to understand the outputs from road user and behaviour surveys.

### **SECOND ROUNDTABLE**

The following presentations formed part of the second roundtable, having each focused in some capacity on the development and utilisation of new data sources and methodologies to inform SPIs and performance monitoring. A consistent theme throughout was the application of AI and machine learning methods to either facilitate mapping of systematic risk (using computer vision technology or using predictive models to measure systematic risk. An underlying aim of all presentations was to encourage the diversification of the data used to measure and create SPIs to relate KSI outcomes to the outputs and effectiveness of road safety interventions themselves. In this sense the content and discussions generated followed on from the final discussion of opportunities and barriers during the first roundtable.

### **Role of AI and New Data sources, (Dr. Apostolos Ziakopoulos, National Technical University of Athens)**

This presentation was the first of two which aimed to set out the opportunities for SPI development based on the latest innovations in the available data landscape. This featured an overview of upcoming data sources which have the potential to inform the discourse around SPIs. There was an inherent focus on 'Big Data' solutions to filling the data - something that was cited consistently in the first roundtable assessing the current state of SPI use at various levels. It was explained that using new sources of data in this way has potentially ground-breaking impacts on the knowledge fusion. The key opportunities identified for SPI development from 'Big Data' innovations were:

- The utilisation of crowd sourced data for artificial intelligence (AI) road network mapping and predictive models (mobile phone data, vehicle on board diagnostics, camera data, car sharing data, bike sharing data, social media data)

- The utilisation of telematics data; private agency sensor data; and public authority sensor or traffic management data
- The use weather, census, digital mapping, and shared mobility data to add granularity.
- Economies of scope alongside other data sources such as collision data on traffic volume, speed distribution and location.

The key challenges in broadening the horizon of data sources to inform SPI development were identified as:

- The interoperability between vast datasets and platforms to manage the data is complex, and the output from the data may still be one dimensional or unrepresentative.
- The use of these types of new data sources has data protection implications and therefore there is a need for updated legal and regulatory frameworks.
- Dynamics of the road safety data used need to be taken account of for maximum benefit, such as data harmonisation; knowledge levels of best practice; mandated sharing of aggregate vehicle data; definition of minimum datasets; collection of data on traffic volume, speed distribution and location.

### ***TomTom's global data and data services ready to support road safety innovations, (Bart Volckaert, TomTom)***

This presentation showcased the different types of data generated by TomTom products and services, for the purpose of outlining the data's applicability for informing SPIs and their measurement by road safety stakeholders. From a technology provider's perspective, it was suggested that whilst there is substantive data available, it is not always utilised fully by road safety stakeholders. Three types of product within the company's portfolio were identified as being useful in this capacity:

- Traffic density products: These allow for mapping of traffic densities within road networks and the data has applicability for ascertaining where different thresholds and types of traffic are over any given timeframe.
- Map products: These can facilitate the mapping of a variety of road attributes data which has relevance for the adoption of iRAP rating SPIs (and by extension to the UN Sustainable Development Goal targets connected to the percentage of traffic on roads above specific safety rating thresholds)
- Mobile mapping products: This provides LiDAR point clouds and 360-degree imagery used in AI and machine learning processes.

### **Percentage of travel and vehicle speeds, (Dr Craig Smith, Agilysis)**

This was the second presentation to consider the expansion of the data landscape used in the context of supporting the measurement of recommended SPIs. The traditional data sources used for road safety monitoring purposes were set out, with the most common being data from DfT traffic counts; highway authority traffic surveys; and spot speed surveys. Alternative sources and methods involve the use of telematics data on a network-wide basis and the use of computer vision technology for mapping and predictive risk analysis. As with previous presentations, the applicability of new data sources for measuring the percentage of travel was outlined. The primary focus of illustrating the benefits of using telematics data was outlined with recourse to:

- Speed and traffic flow data acquired from telematics, used by both Basemap and Ordnance Survey (UK Speed limit Map) to assess levels of compliance
- Speed Compliance Dashboard (Agilysis) which features an interactive dashboard to identify where average speeds are highest and over the posted limits

### **Highly detailed road and asset information, (Steve Birdsall, GAIST Intelligence)**

This presentation built upon others in the second roundtable by demonstrating how new data sources for informing SPI development can be connected to allow for detailed insights comparable across road networks. The content had particularly relevance for road infrastructure related SPIs, and to a lesser extent, those related to behaviour and the impact on road surface condition. Three types of data discussed (roughness and friction data; forensic condition data; high-definition imagery) are used in the following ways:

- Specified road detail surrounding surface condition and environment, and junction dynamics to give a high level of granularity
- Imagery manipulation: different viewpoints are aggregated, and the full environment can be viewed by in-road object / vehicle removal.
- Dynamic performance data can be viewed in real time to assess road infrastructure deterioration. This has been done for most roads nationally for comparative assessment
- Road Trace: what behaviour is occurring (etc. near misses / harsh braking) via a collaborative picture built with partner data; this is combined with safety inspection activity to verify and add to this view. This helps to assess how roads are deteriorating with predictive problem diagnosis. The safety and risk are therefore mapped in real time, assisting SPI development.

### **Measuring Road Safety on the SRN in Real Time (Peter Mildon, Vivacity Labs)**

This presentation considered the use of AI software techniques for providing real time data for either the extraction of near miss data or for greater insight into the route causality of collisions. The methods presented for assessing these road safety dynamics involves the detection of road users via a combination of 2D and 3D imagery. This allows for the following types of outputs:

- Analysis exploiting different frames of view and the generation of 3D playback models for geospatial analysis.
- Specific analysis for different near miss and collision scenarios (generalised outputs versus bespoke analysis)
- Generation of analysis which considers factors such as such as post-encroachment time and time to collision

### **Machine Learning to determine unpaved road condition form satellite imagery (Robin Workman, Transport Research Laboratories)**

This presentation continued the theme of using AI and machine learning methods to contribute to collecting road safety data for SPI related development. The main focus was on TRL's work in developing machine learning models, using satellite imagery to determine the condition of unpaved roads in low-income countries. The key stages in the development and deployment of a model involved:

- Ground truthing: This involved determination of unpaved road surface condition by using local condition data and auditing using local assessment guidelines (using dashcam video footage and mobile apps)
- Pixel variation: Variations in pixel intensity can be used to identify condition
- Road extraction: Exploration of how machine learning could enhance and automate condition assessment; a deep learning model was trained using the imagery
- Precise extraction: Development of a procedure using open source libraries and Python to clean the final outputs.

## The Use of AI on Smart Mobility Living – London / TRL projects (Jonathan Clark, SMLL)

This final presentation focused on the application of AI for mobility solutions which are aimed at supporting organisations in terms of technological service provision. An emphasis was maintained on route lane planning, digital infrastructure development, and their place within user research design. The supporting case study Project 'ServCity' was presented, which is considering three types of communication architectures with the aim of:

- Developing blueprints for connectivity: Establishing blueprints for communication architectures
- Evidencing performance: Establishing the performance levels of automated technology, and the associated communication architectures as road safety infrastructures.
- Validating cutting-edge technologies: contributing to the evidence base for the next generation of automated solutions to overcome the complexities of automated driving in busy cities.

## DISCUSSIONS AND BREAKOUTS

This section of the report delves into the discussions, breakout sessions and interactions, as well as the wider contributions made by all those involved collectively. Rather than a chronological break down of what was discussed over the course of the two roundtables, all of the contributions are summarised according to Safe System area. This ensures that those seeking to build upon the contributions made can clearly identify where current priority is focused, and crucially where more development is needed in terms of practical SPI deployment. The main points discussed were:

- Speed related SPIs and the data needed for them are monitored and collected the most frequently
- A speed SPI should be centred on compliance with a safe speed and not necessarily with the posted speed limit
- Vehicle related SPIs and the data needed for them are not widely collected and therefore not monitored. The main barrier to this situation is the accessibility of the data required itself, despite its frequent collection by vehicle technology providers.
- Vehicle SPIs relating to vehicle technology and safety ratings are considered to be important; whilst new information on vehicle safety mechanisms activation would be useful for monitoring
- Road related SPIs and the data needed for them are collected on an intermittent basis, despite being reasonably accessible.
- Road SPIs may be difficult to compare directly between authorities considering road network differentiation. Universal safety benchmarks are needed moving forward for robust comparison and analysis.

- The costs of systematic iRAP road network assessments for informing road infrastructure indicators are expensive, although the benefits are wider than just the creation of an SPI.<sup>1</sup>
- There is disparity between what is collected to inform road use SPIs and collection frequency. Alcohol and drug use SPIs should be a focus but there is uncertainty in how to innovate indicator measurements to facilitate monitoring outside of prosecution levels.
- Post-collision SPIs and the data needed for them are often not monitored, despite being collected. Response times should be the primary focus of a post-collision SPI
- Better co-ordination between the data outputs is needed, with trauma coverage indicators not monitored.

The discussions are summarised in the five Safe System areas below.

### SAFE ROAD USE

There was moderate consensus between participants about both the readiness and usefulness of SPIs relating to behaviour and road use, with some differing views. A majority of participants felt that for alcohol and drug use; handheld device use; seatbelt use, the data needed for these indicators was collected sporadically. Child restraint use data was considered to be collected on a rarer basis. This indicator and that of rear seatbelt use were deemed to be not used widely. Concern was raised in the discussions about the disparity between measuring these types of indicators and levels of prosecution. SPIs for alcohol and drug use, for example, were seen through trends indicative of prosecution levels and not necessarily the frequency of their occurrence within the data.

The creation of a new SPI relating to sober driving was discussed. Measuring this as an activity was considered unsuitable based on resource and approach, and whilst randomised testing was defended, a majority felt that road user behaviour surveys were the best way to monitor such an activity. Measuring sober driving is trickier as it can be difficult to collect robust data. Random drug and alcohol testing is possible and can collect data on other offences but there is a need to decide on sample sizes. An alternative enforcement-based approach would be to measure the proportion of stops that result in a positive test, but this will then be dependent on enforcement tactics used. During the prioritisation session, alcohol and drug use was selected by the highest percentage of votes for what should be the topic of focus within road use SPIs. This was followed by handheld device use, seatbelts and child restraints. Helmet wearing and casualty rates were not considered to be as important for road use SPIs.

### Recommendations

Identify a standard set of questions that can be used in local road user surveys to monitor safe road use SPIs around alcohol and drug use, handheld device use and seatbelt use as a minimum. These should be published alongside guidance on possible sampling methods depending on the resources available.

**Road Safety GB commit to taking this recommendation forward during 2022/23.**

<sup>1</sup> iRAP is free to air, however, there are costs associated with collecting the data

## SAFE ROADS

There was a moderate level of consensus across both presentations and discussion activities that data is collected and used for road related SPIs. For whilst many perceived that the data is collected sporadically, a majority indicated that the data is either reasonably or easily accessible. There was a significant level of variation between the perceived level of collection and accessibility for data across different indicators. The data underpinning iRAP risk rating and safety rating indicators was perceived to be reasonably well collected and accessible, to a much greater extent than for other indicators. The data required for measurement of junction treatment and motorcycle provision SPIs was perceived to be rarely collected, as was (to a slightly lesser extent) the data needed for barrier related SPIs, which was considered to be collected infrequently but not easily accessible. A number of participants believed that road SPIs should be monitored at a national level, and that local authorities were at various development stages, which justified national direction for their development and uniform application. A key focus of the discussions were SPIs measuring the percentage of travel of roads with iRAP star rating above best practice thresholds. On a local authority level, turning automatically generated road infrastructure data into SPIs was perceived to be expensive (as were systematic iRAP assessments). Although some local authority representatives suggested that they were seeing the benefits of investment in this area, focus was suggested to be perhaps better placed on smaller selections of roads locally, on the Major Road Network (MRN) or where 75% of travel takes place.

There were difficulties perceived in directly comparing local authorities who measure road SPIs, when the size of jurisdictions or urban and rural dynamics are accounted for.

Alongside consideration of SPI accountability and the development of road infrastructure SPIs specifically, there was agreement around the need for universal standard safety benchmarks which remain constant. The reasons for this were that what constitutes a 3-star road now may not be the case in the future, and that without benchmarks it would be hard to have baselines from which to adapt. What constitutes safety in this sense was therefore cited as requiring robust definition for comparative assessments, as various models evolve.

More understanding is also required regarding the definition of sharp curves and turning provisions for future indicators. Light star rating is available, which catalogues fewer attributes, whilst the use of AI and flow data from other sources are being explored as ways of collecting and coding the data.

During the prioritisation session, a majority of participants stated that the focus of road SPIs should be on those relating to iRAP risk rating or general safety ratings. SPI focus on either junction treatments or barriers was also ranked as a key focus by participants.

Active travel consideration and fatal and serious casualty figures were deemed to be of less importance in the formulation of road SPIs. This reflects a number of

comments made regarding the current use of pedestrian or cyclist related measurements and that SPIs are principally about road safety output as opposed to outcomes. SPIs discussed as ambitions for future development included '75% of travel on 3-star roads or above' and '100% of urban roads that are safe for vulnerable road users (VRUs).

### Recommendations

Existing SPIs for % travel on 3\* roads or above for the SRN should be extended to the MRN and considered for 75% travel in each local authority area.

National guidance should be developed for assessing the safety of urban roads for VRUs based on infrastructure and speed criteria and used to develop SPIs based on the % of urban roads that meet these criteria.

## SAFE SPEEDS

A speed SPI should therefore cover compliance with a safe speed and not the posted speed limit (because any speed limit reductions could create poor SPI performance but better safety outcomes). This is because in a Safe System, limits are set according to safe impact thresholds for different collision scenarios. Methodologies for monitoring Safe Speed SPIs, and knowledge gaps surrounding the data, still requires focus despite the fact that some local authorities are beginning to utilise other sources, such as telematics data.

There was notable appetite to continue to facilitate the monitoring of speed related SPIs. During the prioritisation session, all of the topics under Safe Speeds (as different options for SPI focus) were considered to be important as the basis of speed related SPIs. In the anonymous poll, 76% of participants indicated that 'Average Speed' should be the focus of an SPI. This option received the highest percentage of votes. The other two options: '85th percentile' and 'speed limit setting' both received 71%. An interactive whiteboard exercise followed where participants added comments about why they would want a speed SPI for that topic and how they would address the outcomes it relates to. On the creation of single indicator, many suggested that more consensus on definitions was needed to monitor the suggested SPI target of '90% of travel on roads with safe and appropriate speeds and speed limits'.

### Recommendations

Identify criteria for what constitutes a safe speed on different types of road within the UK road hierarchy, aligned to design guidance. This will enable SPIs on % road that meets these criteria and % traffic complying with the safe speed limits to be established.

National guidance on sampling methods to monitor network-wide speeds should be developed to support local authorities in providing consistent and comparable data.

## SAFE VEHICLES

There was a moderate level of consensus across both presentations and discussion activities that data is collected for vehicle related SPIs, but with an overarching concern, however, that the main barrier to their development surrounds data accessibility. Partnerships and agencies were identified as having particular challenges in acquiring vehicle technology data from commercial entities who generate it through their products and services. A notable number of participants therefore believed that a national framework and supporting mechanism were needed to improve the situation. A majority of participants noted, unsurprisingly, that vehicle technology data was collected but that it was not easily accessible. On the accessibility of data and the readiness of SPI measurement relating to vehicle safety ratings, a notably higher percentage of participants agreed that this type of vehicle data was more easily accessible. The access to data needed to monitor both these SPI types is reliant on action from vehicle manufacturers, given that vehicle technology data relates to the fitment of safety mechanisms, and that safety rating data is an aggregate of scores from collision testing. Again, there was a notable appetite to facilitate the monitoring of vehicle related SPIs. During the prioritisation session, both vehicle technology and vehicle safety ratings were considered to be equally as important for the focus of vehicle related SPIs (84% of participants voted for the topics in the survey). An interactive whiteboard exercise followed where participants added comments about why they would want a vehicle SPI for that topic and how they would address the outcomes it relates to. On the development of new and useful vehicle SPIs, presentations on new data sources prompted many participants to consider it useful to know where vehicle safety mechanisms are activated (such anti-lock brake systems and automatic emergency braking). A role for government and proactive data sharing were again identified as facilitators in this discussion. National SPIs on light goods vehicles (LGVs); local government procurement standards; and levers to collaborate on wider policy areas were all discussed in this context.

### Recommendations

National SPIs should be developed for both vehicle technology and vehicle safety ratings (NCAP) for new vehicles sold in the UK. Data on regional variations should be made available to support promotion activity around vehicle safety.

## POST-COLLISION RESPONSE

There was a discussion about whether response times are already available and if ambulance services are recording the number of minutes after notification it takes for them to attend a collision. It was confirmed that the information is available, but the triangulation of data is the key element. A majority of participants believed that data for response time and trauma coverage indicators is collected but that it is not easily accessible. Accessibility was perceived to be higher for response times than for trauma coverage. Participants believed that response time should be the priority topic as the basis of an SPI.

Local authorities have not been ready to report on this information, and the strengthening of partnerships and the involvement of emergency service stakeholders is required. It was argued what the relationships are between injury outcomes and response times and this should be quantifiable to be able to improve safety outcomes. There was a discussion on whether post collision response SPIs should just cover professional assistance or would also include bystander involvement. If it includes bystanders, there was uncertainty as to how this could be measured. Could the amount of first aid training provided be used as an outcome measure? Officially, medical attention does not start until the emergency services arrive, but fire and rescue officers are being trained in medical support, which could influence the monitoring of this SPI. It was suggested therefore that perhaps data reliance should not rely on one service (ambulances), given the use of other units, such as air ambulance.

### Recommendations

A detailed evidence review is required to determine the most appropriate SPIs in this area, including emergency response, treatment, and victim support.

## CONCLUSION

This report has summarised the contributions, activities, and discussions which have together formed two roundtable events on the timely matter of SPI development. Developing and measuring indicators, at both a national and sub-national level, formed the basis of the virtual events, and it is hoped the insights generated by all involved will help to maintain a focus on the potential of SPIs to contribute to the improvement of stagnant road safety performance across Great Britain and beyond.

The events would not have produced the same effectiveness in galvanising calls for more development had it not been for the variety of perspectives and engagement of presenters and attendees alike. The presence of many road safety stakeholders, including representation from national bodies and local authorities, was complimented by input from technology providers and others who have the potential to collaborate and drive forward progress in this area. The events shed a spotlight upon the various barriers to development, alongside opportunities for acting in unison to generate solutions and apply pressure to national policies where necessary. Diversification of the data used to monitor indicators and formulate new SPIs, is a part of overcoming such barriers. The varied contributions by many in the context of Safe

System activity areas, suggest that those with designated responsibility for road safety such as partnerships and agencies, are at very different stages of indicator deployment.

The use of safety performance indicators as an integrated tool within road safety strategies and monitoring frameworks for reducing the burden of road traffic collisions (RTCs) has received unanimous confirmation. The presentations, discussions, and recommendations summarised here represent a platform from which to take stock of both the barriers and opportunities faced in this area – and as such demonstrate it is imperative that all responsible stakeholders seek to capitalise on efforts made so far and assist in carrying forward the momentum in SPI development.

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# AGENDAS

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## ROUNDTABLE ONE

Session 1 – 10:30 – 12:30

10:30 – 10:40	Introduction to the event	MS & RO
	<ul style="list-style-type: none"> <li>• <i>Why is this event taking place?</i></li> <li>• <i>Roundtable format, participation requirements, privacy, outputs from this event.</i></li> <li>• <i>Roundtable #2 outline and outputs from this event to facilitate that</i></li> <li>• <i>Agenda</i></li> </ul>	
10:40-11:20	Road Safety Strategies, SPI philosophy, determining technical guidelines	
	<ul style="list-style-type: none"> <li>• <i>Road Safety strategies and Safety Performance Indicators</i></li> <li>• <i>VIAS Baseline project (EU)</i></li> </ul>	PT WvdB
11:20-11:40	Breakout Exercise – How important are SPIs? <ul style="list-style-type: none"> <li>• <i>What is currently being measured as an SPI?</i></li> <li>• <i>Is there an appetite to collect and review these in local authorities</i></li> <li>• <i>Are casualty targets more important?</i></li> </ul>	All
	<i>3 groups with facilitators to lead through those questions. Collate notes, ensure everyone gets a chance to comment.</i>	
11:40 – 11:55	Feedback from groups	MS
	<i>Led by facilitators, chair may ask for clarifications</i>	
11:55 – 12:20	SPIs already being used in the UK	RO
	<ul style="list-style-type: none"> <li>• <i>Transport Scotland</i></li> <li>• <i>National Highways</i></li> <li>• <i>Cambridgeshire</i></li> </ul>	
12:20 – 12:30	Discussion	All

Session 2 – 13:15 – 15:15

<b>13:15 – 13:40</b>	Prioritisation of SPI based on need	TF / DC
	<p><i>Whiteboard exercise</i></p> <ul style="list-style-type: none"> <li>• <i>From a list of SPIs which would be the most valuable?</i></li> <li>• <i>How do specific SPI link to the safe system and interventions?</i></li> <li>• <i>Whiteboard list then votes</i></li> </ul>	
<b>13:40 – 14:00</b>	SPI state of readiness - Breakout	All
	<p><i>Taking 6 specific SPI (2 per breakout group, attendees pre-notified of their groups)</i></p> <ul style="list-style-type: none"> <li>• <i>What is the state of readiness for collection?</i></li> <li>• <i>Can we establish baselines?</i></li> <li>• <i>National standards and local reproducibility?</i></li> <li>• <i>Opportunity for international comparison?</i></li> <li>• <i>Individual breakout groups review 2 SPI each</i></li> </ul>	
<b>14:00 – 14:15</b>	Feedback from groups	MS
	<i>Led by facilitators, chair may ask for clarifications</i>	
<b>14:15 – 14:35</b>	Development of technical specifications - Discussion	MS
	<ul style="list-style-type: none"> <li>• <i>Do we need a national-agreed protocol?</i></li> <li>• <i>De we need main indicators and alternative indicators?</i></li> <li>• <i>How often should they be updated?</i></li> <li>• <i>Responsibility for collection?</i></li> </ul>	
<b>14:35 – 14:50</b>	Data sources – Barriers and opportunities - Discussion	RO
	<ul style="list-style-type: none"> <li>• <i>Third party data and support</i></li> <li>• <i>AI</i></li> </ul>	
<b>14:50 – 15:00</b>	Event summary and comments	MS / RO

## ROUNDTABLE TWO

<b>10:30 – 12:00</b>	Presentations from Technology Providers	RO
<b>12:00-12:30</b>	<ul style="list-style-type: none"> <li>• Q&amp;A</li> <li>• Discussion on which approaches are highest priority / closest to market</li> <li>• Review of what may be missing</li> </ul>	
<b>13:15 – 14:00</b>	Review of road and roadside SPI (breakout) <ul style="list-style-type: none"> <li>○ What are the options for a single indicator?</li> <li>○ What sub-indicators are most valuable?</li> </ul>	All
	<ul style="list-style-type: none"> <li>• Group feedback and discussion</li> <li>•</li> </ul>	
<b>14:00 – 14:15</b>	Feedback from groups	MS
	<i>Led by facilitators, chair may ask for clarifications</i>	
<b>14:15 – 14:50</b>	What might a national framework look like – review of discussion to date <ul style="list-style-type: none"> <li>• What should be directed and collected at a national level?</li> <li>• What local flexibility is required?</li> <li>• Who should set the standards?</li> </ul>	MS
<b>14:50-15:00</b>	<ul style="list-style-type: none"> <li>• <i>Summary and conclusion</i></li> </ul>	



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