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Road Collision Investigation Project (RCIP)

Final project report

Steve Gooding and Elizabeth Box

RAC Foundation

June 2022

The Royal Automobile Club Foundation for Motoring Ltd is a transport policy and research organisation which explores the economic, mobility, safety and environmental issues relating to roads and their users. The Foundation publishes independent and authoritative research with which it promotes informed debate and advocates policy in the interest of the responsible motorist.

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Foreword

Over many years I was party to conversations about the reasons why the Department for Transport had dedicated incident investigation branches for aviation, maritime and rail but not for roads, even though year-by-year the Reported Road Casualties GB statistics persistently and stubbornly revealed a horrifying story of deaths and serious injuries caused by road crashes. But for roads, so my argument went, the sheer number of collisions would make investigating them all impractical for a single branch, and there are already multiple authorities looking into the causes of crashes, most obviously the police when a fatality or serious injury is involved.

It wasn't until I left the Department and found myself debating this issue once more – including being challenged by officials in the Department's road safety team who were revisiting the idea – that two things became clear to me.

The first, and the most important, was that while many people were indeed diligently involved in investigating road crashes there was something of a gap in the learning cycle that exists in other safety critical industries. The most thorough investigations undertaken by the police, in the case of fatalities were, quite properly, more focused on blame – whether there was a case for prosecution – rather than cause – whether measures could be put in place to prevent a repeat occurrence.

The second was that though I could see many thorough and well-intentioned calls for a road collision branch to be created, most simply asserted the need rather than setting out an evidenced business case. So, I sat down to write some ideas on how that business case might be explored in *Towards an Accident Investigation Branch for Roads?* published in December 2017.

'Be careful what you wish for' my Mother used to warn me, and I rather heard an echo of her words when in 2018 Roads Minister Jessie Norman put the ball firmly back in the Foundation's court by giving us a sizeable grant to pursue the ideas I had proposed, but with a clever twist – use a slice of the grant to enable some volunteer police forces to hire dedicated investigators for a fixed period to test whether my theory – that something was missing in the learning cycle – was right.

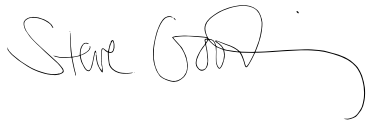
So that's what we did, and four years and a great deal of hard work later I have now completed my 'Damascene' conversion; I am absolutely sure that we do need a national Road Collision Investigation service – a branch enjoying the same legal protections as the other domestic Accident Investigation Branches – and that creating such a body could be a material contribution to getting this country back where we want to be, at the head of the international league table for road safety.

This report documents the work that was done and the calculations that support our recommendations. It references the numerous reports that we have commissioned and published along the way. It has been a long trip, and it isn't over yet – the Foundation looks forward to working with Department for Transport colleagues whose task is to pick up the baton from here.

I hesitate to list our thanks to all the people who have helped us on our way, for fear of missing someone. Wherever we looked and whoever we asked we received nothing but help and encouragement throughout the project. Special mention must, though, go to the members of our Steering Board, to our volunteer constabularies, to Simon French and Winston Rasaiah at the Rail Accident Investigation Branch, to Professor Neville Stanton at the University of Southampton, to the authors of the other reports and analysis we commissioned and to our colleagues at the Department for Transport and in National Highways. We are also hugely grateful to Jessica Uguccioni and her colleagues at the Law Commissions, whose project on autonomous driving ran in parallel to ours, for the constructive dialogue and, ultimately, for the shared ambition to create something new. And I am grateful to my RAC Foundation colleagues, particularly Elizabeth Box whose energy, creativity and persistence has been mission critical throughout.

All I can say in closing is that I am looking forward to the day when I can arrange to meet the newly appointed Chief Road Collision Investigator, a day that can't come too soon.

Steve Gooding

A handwritten signature in black ink that reads "Steve Gooding". The signature is fluid and cursive, with a long horizontal flourish extending to the right.

Director, RAC Foundation

1. Introduction to the Project



Independent bodies are longstanding features of incident investigation practice in the UK and around the world. In the UK the Air Accidents Investigation Branch (AAIB) has been operating since 1915, while the Marine Accident Investigation Branch (MAIB) and Rail Accident Investigation Branch (RAIB) have operated since 1989 and 2005, respectively. All three bodies have the legal power to investigate incidents in their sector and make recommendations about which interventions could be implemented to prevent the recurrence of those events. These recommendations are not binding, but are for the duty holders, relevant organisations or Government to consider in the context of their wider priorities.

Whilst there are differences in structure of the three existing Accident Investigation Bodies (AIBs), largely reflecting the different sectors to which they relate, as well as some minor differences in their founding statutes, there are four clear distinguishing factors they share:

- they investigate for causes and learning, not for blame;
- they do so with the appropriate industry/technical expertise and immense – internationally admired – professional rigour;
- their findings and subsequent recommendations are seen to be independent; and
- by virtue of recommendations being published, industry and policymakers can be held accountable for responding to and implementing the recommendations made.

Of the four, it is the first that stands separate from the basis of a police investigation as the priority for police forces is to investigate crashes with the intention of identifying criminal culpability and bringing individuals to account.

In December 2017 the Foundation published a paper *Towards an Accident Investigation Branch for Roads*. The paper argued that the 'learning loop' for road safety – the backbone of good risk management through which experience is reviewed, changes implemented, and their success monitored – was both incomplete and somewhat random. There are many players seeking to establish why road collisions happen and what could be done to prevent them or at least mitigate their severity, in national and local government, in industry and in academia. Many of the right elements are in place, but key connections are missing. Findings in one case do not get put together systematically with others to spot patterns of causation. Aside from the headline information gathered through the statistical series known as STATS19, detailed data collected by the police, while investigating a serious crash, typically stays locked in the files of individual forces.

Our 2017 paper went on to say that unless something is done differently, it is very hard to see how the stubbornly stable number of deaths occurring year after year on the UK's roads could be reset on the downward trajectory. To the public, the zero-tolerance attitude to death and serious injury adopted for travel by rail, air and sea stands in stark contrast to a somewhat studied indifference to the toll of death and serious injury on our roads – a price that we are, apparently, as a society willing to pay for the convenience road transport provides.

2. Road Collisions – Different in what way?



The 2017 Foundation paper noted that many calls had already been made to create a road collision investigation body in some form, but none had clearly set out how the concept might be trialled in practice, to establish, with evidence, whether or not there was a genuine business case for adding another body to what might already appear to be a rather crowded landscape. How could such a body avoid being overwhelmed by the sheer number of crashes recorded not just every year but every day? And, most importantly, what were the prospects of such a body finding new things about the causes of crashes and the causes of their severity on which action might plausibly be taken?

The paper suggested three possible approaches for a pilot exercise:

- creation of a new, dedicated analytical unit within the Department for Transport (DfT);
- establishment of a competition through which a consortia of willing highway authorities and constabularies could win funding for a trial; and
- through the statement of the Government's requirements in the road investment strategy process to require Highways England (now National Highways) to establish an investigatory unit focused on the strategic road network.

It was recommended that this could be overseen by a 'commission' appointed firstly to produce detailed recommendations as to how the AIB concept could be constructed and piloted for roads, and then remain involved in the running of the pilots, thus being able to make further recommendations in the light of the experience gained.

The DfT response to these suggestions was to accept the thrust, if not the detail, of the Foundation's thinking and to invite the Foundation itself to act as a catalyst for the commission. The DfT proposed that, with DfT grant support, the Foundation should provide funding for three volunteer constabularies to enable them to each recruit a dedicated investigator who would be given access to information held by those forces under the appropriate supervision to ensure it was handled correctly.

Thus, it was that in June 2018 the Foundation received almost half a million pounds of government funding to take forward a pilot programme – the Road Collision Investigation Project (RCIP).

The DfT's £480,000, plus a further £300,000 from National Highways, has been used to develop and trial, in three police force areas, a different approach to identifying and understanding common themes and patterns that result in death and injury on the public highway. It has encompassed a range of activity: interviews with experts in transport and other industries, research into overseas practice, and the trialling of leading-edge modelling techniques, overseen by a programme board that drew in a range of expert perspectives (Annex A). In pulling all the information and experience together we sought to answer the question as to whether there was a positive business case for action to create a Road Collision Investigation Branch (RCIB) in whatever form that might take.

Our answer, as documented in this report, is an unequivocal 'YES'.

3. Project Approach



Three police forces – Humberside; West Midlands; and Dorset, Devon and Cornwall Police – took part in RCIP and recruited dedicated investigators to conduct the project analysis work¹. These police forces were identified by the DfT amongst a pool of forces that had adopted the CRASH (Collision Reporting And SHaring) system and represented a good spread of urban, rural and motorway road environments.

The project investigators were recruited by the police so that they would have access to police files and to serving officers involved in roads policing. They also spent at least part of their time (circa 1 day per week) on matters of particular interest or concern to their host constabulary. In addition to the three locally recruited investigators, a Principal Inspector from the RAIB² was provided on loan to the project and the project management and overall strategic direction was provided by the RAC Foundation team³. The investigatory activity principally focused on reviewing closed-case fatal files. The cases selected for analysis were chosen on the basis of being recently closed and having sufficient levels of data captured to inform an in-depth analysis.

¹ RCIP Investigators – Matt Butler, Dorset, Devon and Cornwall Police; Matty Dale, Humberside Police; Emma Tomlinson, West Midlands Police.

² Winston Rasaiah, Principal Investigator RAIB, Senior Investigation, RCIP.

³ Elizabeth Box, RCIP Programme Manager and Steve Gooding, RCIP Programme Director, RAC Foundation.

3.1 Tools

Several pieces of research were commissioned to inform the method and approach taken by the investigators (See Annex B). Professor Neville Stanton from the University of Southampton was commissioned to produce the report *Models and Methods for Collision Analysis: A guide for policy makers and practitioners*⁴. The report described how incident causation models have changed over time and details the rationale for taking a systems approach to collision investigation. As a result of this analysis, Professor Stanton recommended that the Actor Map⁵ and AcciMap⁶ methods were used for RCIP. TRL was then commissioned to assess the validity of the AcciMap framework by evaluating its compatibility with existing in-depth collision investigation programmes⁷. This comparison showed good evidence for using the AcciMap method to identify sociotechnical system⁸ failures and provide recommendations that could improve future road safety. The report also highlighted several challenges and limitations with the method for consideration, before implementation, to ensure that the recommendations provide useful, evidence-based safety findings (NB while the Actor Map and AcciMap proved their potential through the course of this project the extent of their future adoption would need to be decided as part of the work to establish a RCIB).

During the course of the project, Agilysis were commissioned to produce RCIP police force area profiles to outline, using a neural network analysis of STATS19 data, the collision trends and performance of police force area road safety, in comparison to similar police force areas⁹. This work, alongside an online dashboard for investigator use, helped the RCIP investigators put into context the individual in-depth investigations that they were conducting.

3.2 Training and expert support

Investigator training in the Actor Map and AcciMap investigation approach was provided by Professor Neville Stanton and an ongoing programme of investigator training and road safety knowledge transfer took place across the two-year investigatory period. During this time the RCIP team met regularly for case conferences to discuss ongoing investigations and to share ideas. The team were also introduced to numerous experts in road and vehicle engineering, human factors, national policy and administration as well as product safety to help inform the development of their in-depth report recommendations. The Road Safety

⁴ Stanton, N.A. (2019). *Models and Methods for Collision Analysis: A guide for policymakers and practitioners*. RAC Foundation. Accessed 14 April 2022 from https://www.racfoundation.org/wp-content/uploads/Models_and_methods_for_collision_analysis_Stanton_March_2019.pdf

⁵ Identification of the main organisations or individuals contributing to the collision.

⁶ The main events, decisions and actions – or lack thereof – contributing to the collision.

⁷ Barrow, A. (2019). *RAC Foundation RCIP Feasibility Study*. PPR914. TRL. Accessed 14 April 2022 from https://www.racfoundation.org/wp-content/uploads/RACF_RCIP_Feasibility_Study_TRL_July_2019.pdf

⁸ Sociotechnical systems comprise the social (human) systems together with the organisational structures and technical systems that support them, at all levels from the driver, car and driving environment, through traffic management, road planners, regulatory bodies and associations, to government and beyond.

⁹ Smith, C. & Walton, B. (2021). *RCIP Police Area Collision Profiles: Methodology*. RAC Foundation. Accessed 14 April 2022 from <https://www.racfoundation.org/wp-content/uploads/RCIP-Draft-Final-Report-Methodology-FINAL.pdf>. Individual area profiles were also developed for Dorset, Devon and Cornwall <https://www.racfoundation.org/wp-content/uploads/RCIP-Draft-Final-Report-DCD-FINAL.pdf>; Humberside <https://www.racfoundation.org/wp-content/uploads/RCIP-Draft-Final-Report-Hum-FINAL.pdf>; and West Midlands <https://www.racfoundation.org/wp-content/uploads/RCIP-Draft-Final-Report-WMP-FINAL.pdf>

Foundation also provided the RCIP Investigators with road engineering analysis for the individual cases being investigated. Following completion, all in-depth reports were first reviewed by the immediate RCIP team and then subjected to an expert subject matter review provided by TRL. At the close of the project, a total of 37 in-depth reports had been prepared. Throughout the project, all investigators had access, via their respective police forces, to Trauma Risk Management (TRiM) approaches and policies, to provide them with ongoing welfare and mental health support.

3.3 Tonic Analytics

Part of the RCIP involved commissioning Tonic Analytics, working under the joint National Highways/NPCC 'Galileo' programme¹⁰, to create a digital twin of the motorway and strategic road network in order to generate a clearer picture of the true costs of incident-related delay, starting with instances of diesel spillage from heavy vehicles involved in collisions.

The Tonic Analytics work, based on the National Highways 'control works' dataset of recorded incidents, revealed the extent of delay and, consequently, the rationale, for looking hard at the steps that might be taken to minimise diesel spillage (which routinely results in full carriageway closure and the need for resurfacing – hence the excessive delay consequences). It has also flagged two issues that need to be pursued. First, the numbers in Transport Analysis Guidance (TAG) (the Department for Transport's suite of guidance on how to assess the expected impacts of transport policy proposals and projects) for the cost of delay are – at best, to our eye – implausibly small. More work is needed to review and validate these costs. Second, over the period of the Tonic Analytics work it proved impossible to extract some statistics from National Highways' (formerly Highways England) systems, including resurfacing costs. For that reason, we have not attempted to put a cash cost on motorway delay into the overall economic case – our suspicion is that it is far higher than TAG currently allows. See Figure 1 below for a summary of the Tonic Analytics findings.

That said, the main value of the Tonic Analytics work was to create and demonstrate the value of an analytical tool, based on similar approaches used in the aviation sector. The tool enabled the capture of all the relevant factors relating to disruptive incidents on the National Highways network, the potential to then identify the likelihood and location of future incidents, and ultimately to signpost the nature of interventions that could prevent them or mitigate their impact in terms of casualty reductions and traffic delay. Diesel spillage from trucks involved in collisions clearly has a significant impact on the length of time it takes to re-open the carriageway after an incident, sufficient to warrant attention being given to ways such spillage could be avoided or addressed to minimise the spread of fuel.

¹⁰ Tonic Analytics (no date). *Safe and Secure Roads*. Tonic Analytics. Accessed 14 April 2022 from <https://www.tonicanalytics.com/news/tonic-selected-for-important-uk-road-safety-and-security-project>

Figure 1 – Tonic Analytics analysis of collision incidents recorded in National Highways Control Works in January and February 2020 (pre-pandemic, normal traffic levels)

At locations where Motorway Incident Detection and Automatic Signalling (MIDAS) data is also available

The whole carriageway is closed and disruption is for 1 hour or more.

- Average of 41 collision incidents per month in January and February (1% of all recorded incidents in ControlWorks)
- Average of 12,187 vehicle journeys impacted, leading to at least 13,420 hours of delay per incident
- Extrapolated for 12 months: 5,996,004 vehicles impacted and 6,602,640 hours of delay (275,110 days, 753 years)

Of these incidents during the day:

- 3 involved a fatality
- Average: 36,723 vehicle journeys impacted and at least 52,862 hours of delay per incident
- Extrapolated for 12 months: 1,322,028 vehicles impacted and at least 1,903,032 hours of delay (79,293 days, 217 years).

Impacts 2.4x the number of journeys

- 2 involved a Diesel spill
- Average: 43,670 vehicle journeys impacted and at least 54,062 hours of delay per incident
- Extrapolated for 12 months: 1,048,080 vehicles impacted and at least 1,297,488 hours of delay (54,062 days, 148 years).

Impacts 2.9x the number of journeys

Source: Tonic Analytics (2021)

4. Project Findings



4.1 Investigation findings

In total, the RCIP Investigators produced 37 in-depth reports across the project. These reports have been reviewed, and their findings aggregated to provide some overarching recommendations arising from the work.

Professor Neville Stanton's aggregation of the reports¹¹ found that a total of 1195 actors (individuals or organisations) and 1656 actions, events and decisions – or lack thereof – were found to have contributed to the 37 collisions investigated. Professor Stanton observed that there were relatively few, common actors that were associated with the majority of collisions and that the analysis pointed to a common contributory network of actions and decisions related to road collisions. Both blunt-end and sharp-end factors (See: Table 1 below) were identified within the in-depth reports, which provides an excellent example of the types of safety learning that can be forthcoming as part of in-depth, no blame, investigation. The report by Professor Stanton also argues the need for a national, strategic, road safety plan aimed at increasing the protective factors whilst simultaneously reducing the contributory factors in the road safety system.

¹¹ Stanton, N.A. (2022). *Road Collision Investigation Project in-depth investigations: Development of taxonomies and meta-analysis*. RAC Foundation. Accessed 14 April 2022 from <https://www.racfoundation.org/collaborations/road-collision-investigation-project>

Table 1: Actions and decision identified with RCIP in-depth investigations related to road collisions

Blunt-end examples	Sharp-end examples
<ul style="list-style-type: none"> • Legislation and regulation • Information for the public • Industry and government • Budget and finance • Standards • Campaigns, communication and co-ordination 	<ul style="list-style-type: none"> • Road design • Signage and monitoring • Personal protective equipment • Substances (i.e. drugs and alcohol) • Vehicle control • Vehicle design • Vehicle maintenance and condition • Road conditions

Source: Stanton (2022)

Of the 37 investigations conducted, they comprised the collision types outlined in Table 2 below.

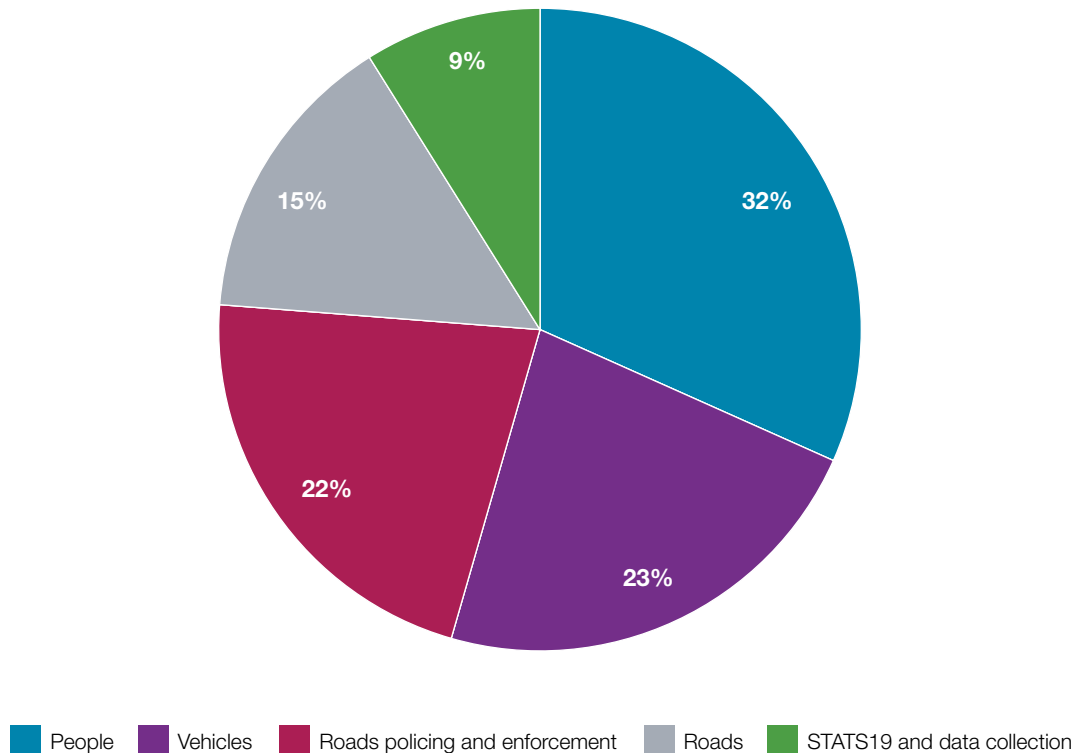
Table 2: Collision types investigated by RCIP

Collision Type	Number of reports
Car vs pedestrian(s)	9
Car vs stationary object (tree, wall, lamppost)	5
Motorcycle vs stationary object (tree, ditch, wooden fence, telegraph pole)	5
Car vs car	4
Car vs motorcycle	4
Van vs van	1
Coach vs car	1
Motorcycle vs motorcycle	1
HGV (heavy goods vehicle) vs bicycle	1
HGV vs vehicle recovery truck	1
Car vs bicycle	1
Car vs stationary vehicle transporter	1
Van vs bridge column	1
Tractor vs motorcycle	1
Van vs bicycle	1
TOTAL	37

Source: Stanton (2022)

A parallel aggregation of the 37 reports by Winston Rasaiah¹² found that recommendations for 'People' followed by 'Vehicles' and 'Road Policing and enforcement', were most common amongst the recommendation areas (See: Figure 2 below).

Figure 2: Recommendation types arising from an aggregation of the RCIP in-depth road collision investigation reports (n = 37)



Note: Percentages may not appear to sum to 100% owing to rounding
Source: Rasaiah (2022)

Rasaiah's summary work goes on to explain that investigations identified active and latent factors and ascribed a level of confidence to the causal links identified (High, Medium and Low) – 'active factors' are unsafe acts that are directly linked to the collision (i.e. Motorcycle rider was dazzled by spotlight style headlights on another vehicle). 'Latent factors' are pre-existing conditions which may have been dormant for a long period of time (i.e. Motorcycle rider was out of practice with riding his motorcycle). The top 11 recommendations across all the in-depth investigations, at different AcciMap levels, are outlined in Table 3 below.

¹² Rasaiah, W. (2022). *RCIP Recommendations Summary – February 2022*. RAC Foundation. Accessed 14 April 2022 from <https://www.racfoundation.org/collaborations/road-collision-investigation-project>

Table 3: Top 11 RCIP recommendations across all groups and all AcciMap levels

Rec no.	Recommendation area	Group	Evidence base**	No. of RCIP recs
1	Drink and drug-driving and cycling	RPE*	OLMH	42
2	Motorcycle PPE & airbag jackets	People	OLMH	36
3	Allocation of police resources for enforcement and investigation	RPE*	OLM	32
4	Motorcycle helmets	People	OLMH	30
5	Vehicle passive safety	Vehicles	OLMH	30
6	Increasing proportion of safer vehicles in UK	Vehicles	OLMH	27
7	Roadside hazards	Roads	OLMH	27
8	Reducing speeding on local roads	Roads	OLMH	26
9	THINK!/publicity/education campaigns	People	OLMH	24
10	Vehicle active safety	Vehicles	OLMH	22
11	Motorcycle safety	Vehicles	OLMH	21
TOTAL				317

*Roads policing and enforcement **O = Observation, L = Low, M = Medium, H = High
Source: Rasaiah (2022)

In reviewing the RCIP recommendation findings, it is important to recognise that the fatal (and a small number of serious injury) cases selected for analysis as part of RCIP were an ‘opportunity’ sample. The aggregated recommendations are therefore not to be seen as a reflection of what a Road Collision Investigation Branch would discover, nor are they in any way a prioritised list, rather they illustrate that there is great potential for safety learning in many areas of road safety, when individual cases are looked at in-depth, beyond the current police investigatory processes.

In addition to producing in-depth reports, the RCIP investigators have also produced illustrative safety alert notices to show the sort of notice that a branch might generate, as a basis for further discussion in future¹³.

4.2 Parallel interviews

Throughout the course of the project a series of formal interviews were held with individuals with relevant experience. The Transafe Network was commissioned to conduct an international review of approaches to collision investigation which was published in December 2020¹⁴. This report found numerous countries throughout the world to be applying some form of independent analysis to road crashes and that the activities of the investigating bodies was judged to be of high value in promoting improved safety. While the precise form of investigating

13 Three example Safety Advice Notices have been produced as part of RCIP: Safety Advice Notice 2021-02: Motorcycle jackets, intervention times and standards, Safety Advice Notice 2021-03: Road safety considerations for the Fowey Royal Regatta and Safety Advice Notice SWMB07: Motorcycle Helmets and Safety Standards. These can be viewed on the RAC Foundation website at <https://www.racfoundation.org/collaborations/road-collision-investigation-project>

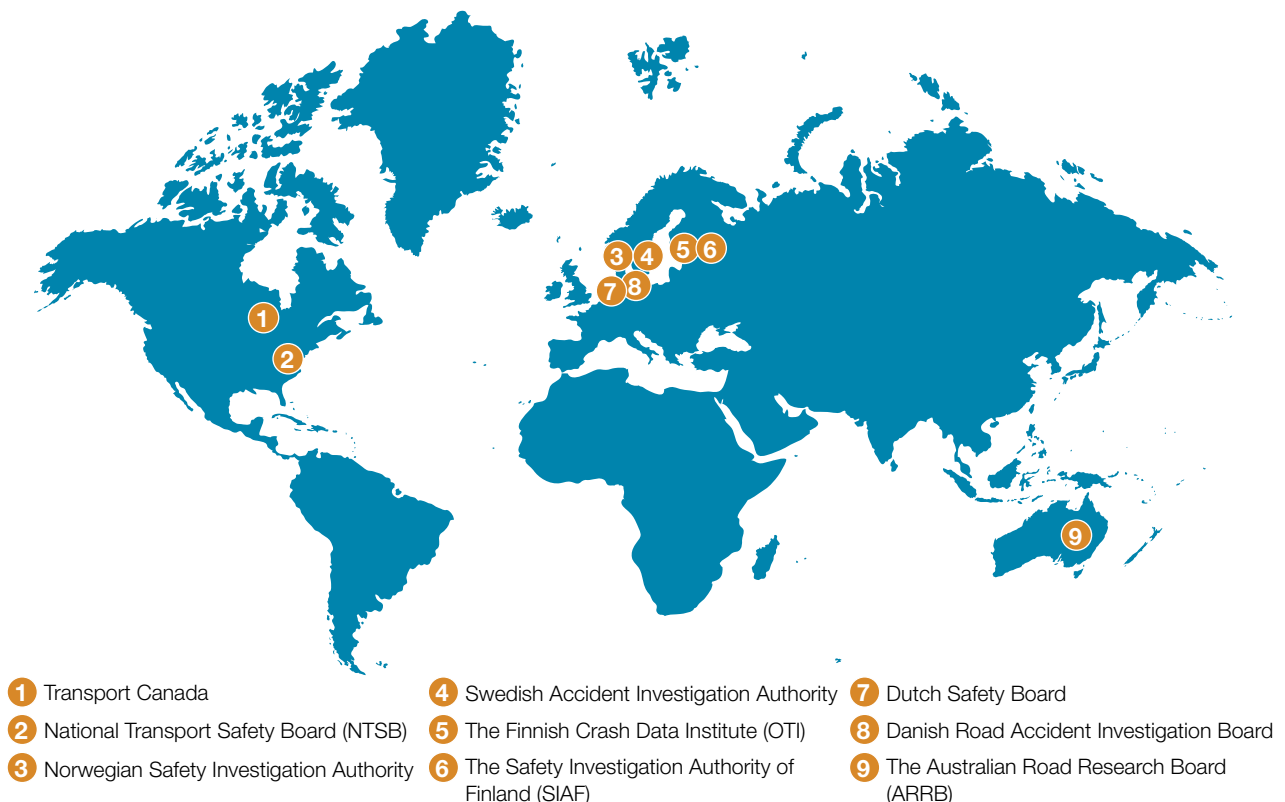
14 Jeavons, S. & Runacres, A. (2020). *International Review of Road Collision Investigation Approaches*. RAC Foundation. Accessed 14 April 2022 from https://www.racfoundation.org/wp-content/uploads/International_review_of-road_collision_investigation_approaches_Jeavons_Runacres_December_2020.pdf

body varies between countries – some cover roads and other transport modes, others have a still broader safety remit – the report unequivocally recommended establishment of a new, independent investigating body for the UK to investigate major incidents (including attending at the incident location) and conduct thematic investigations at its discretion, with full access to police records, powers to question police investigators, and general powers to obtain relevant information. We discuss the form these powers might take below.

Transafe found consistent support for the concepts of investigating cause (rather than blame) and of identifying patterns of injury as well as deep-diving into the circumstances of individual incidents. In order to enable the best quality investigation into the causes and the consequences of collisions (including injuries sustained), a key theme to emerge was the value of having legal protection for safety investigators (i.e. that whilst safety investigations might complement a police investigation, the material gathered by safety investigators should not be disclosed to the police). This allows investigators to hold candid interviews with individuals who might otherwise feel compelled to exercise their right to silence were the police involved – nor do interviewees have a right to silence when interviewed by an investigator. The experience of other no blame investigatory bodies is that the powers to compel witness testimony are important, but rarely need to be enforced in practice when witnesses fully understand the safety learning role of the organisation and the legal protections afforded to the testimony they provide.

Representatives from international investigatory bodies with a roads remit in Canada, the USA, the Netherlands, Denmark, Norway, Sweden, Finland, and Australia were interviewed as part of RCIP.

Figure 3: Collision Investigation Branches interviewed in May 2021



Source: Authors Own

We could find no formal Cost Benefit Analysis business cases such as the Department for Transport's Investment Committee might expect to see from any of the international investigatory bodies – the fact that we asked about this was largely received with bemusement, on the grounds that where such bodies exist they do so on the basis that the rationale for their existence is self-evident, subject to annual processes for justifying their budgets. Nor did we find any consistent mechanisms for tracking the effectiveness of the investigating bodies in practice – recommendations were made and acted upon and the outcomes judged to be 'safer' and while there were examples of the implementation of recommendations being tracked, and their effectiveness measured – for example, in Norway, where the number of HGV collisions were reviewed in relation to recommendations implemented – there was generally no quantification of the improvement achieved in terms of a costed road safety outcome. Despite this, all the bodies spoken to stated that they received excellent support in their jurisdictions for the work conducted, and that their work was considered to positively influence road safety outcomes.

4.3 Parallel developments

The Road Collision Investigation Project overlapped with the joint DfT/Home Office review of roads policing¹⁵ and developments in the Forensic Investigation Service. We did not identify anything in these initiatives that cut-across or contradicted the emerging case for the creation of a new investigatory service.

In addition, during the course of the project, in 2018 the Government, through the Centre for Connected and Autonomous Vehicles, (CCAV), invited the Law Commission of England and Wales and the Scottish Law Commission (together, the Law Commissions) to make recommendations for the safe and responsible introduction of self-driving vehicles on public roads. The Law Commissions' report¹⁶, published in January 2022, sets out comprehensive recommendations for creating an appropriate safety framework for accrediting the roadworthiness of automated driving systems and for maintaining their safety in use. Relevant to the Road Collision Investigation Project, the report also states:

“We note that currently the RAC Foundation in collaboration with the DfT and National Highways are undertaking a project to investigate the feasibility of a road collision investigation branch (RCIB)... we believe that if such a road collision investigation unit were to be established, it would be preferable to give this unit responsibility for investigating collisions involving AVs – which would avoid duplication of effort. As many stakeholders have also indicated, at least in the initial stage of deployment, collisions involving AVs are likely to involve conventional vehicles as well.” P.118

¹⁵ DfT (2020). *Roads Policing Review: Call for evidence*. Department for Transport. Accessed 14 April 2022 from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/899574/roads-policing-review-call-for-evidence.pdf

¹⁶ Law Commissions (2022). *Automated Vehicles: joint report*. Law Commission of England and Wales, Law Commission No 404, Scottish Law Commission, Scottish Law Commission No 258, HC 1068, January 2022. Accessed 14 April 2022 from <https://s3-eu-west-2.amazonaws.com/lawcom-prod-storage-11jsxou24uy7q/uploads/2022/01/Automated-vehicles-joint-report-cvr-03-02-22.pdf>

We agree that if a specialist service is to be established for investigating collisions involving automated, self-driving vehicles, that service would best form part of a specialist independent service charged with investigating road collisions more generally, not least because in the early days of automated driving systems being authorised for use on public roads, any such collisions are likely to involve non-automated vehicles and, hopefully, be few and far between. The investigatory powers to obtain information would be very similar to those that a more general RCIB would need. More work would be needed to establish the boundary between a RCIB and, if accepted, the Law Commissions' further recommendation for the establishment of an 'in-use regulator'¹⁷ for automated vehicles.

Furthermore, highly automated vehicles are not the only 'disruptors' that need to be factored into the road safety environment – e-scooters and other new forms of mobility are creating fresh challenges, as is the shift to alternatives to traditional fossil-fuelled vehicles (in November 2020 the NTSB issued a safety report on the safety risks to emergency responders from lithium-ion battery fires in electric vehicles¹⁸) all of which could fall within the ambit of a road-focused investigatory body. That said, more work will be needed to explore the precise division of functions between the 'in-use regulator' and the 'serious crash investigator' functions that the Law Commissions have advocated.

17 The Law Commissions report describes the in-use regulator as having 'statutory duties and powers to maintain in-use safety once AVs are deployed on GB roads' (Law Commissions, 2022, xix)

18 NTSB (2020). *Safety Risks to Emergency Responders from Lithium-Ion Battery Fires in Electric Vehicles* – Safety Report. NTSB/SR-20/01 PB2020 – 101011. National Transport Safety Board. Accessed 14 April 2022 from <https://www.nts.gov/safety/safety-studies/Documents/SR2001.pdf>

5. The Business Case



The DfT has a very specific framework for capturing and considering the 'business case' for any new initiative or project, which looks at the proposal through five lenses:

- Is there a fit with wider public policy objectives – the 'strategic case'?
- Does the initiative demonstrate value for money – the 'economic case'?
- Would the initiative be commercially viable – the 'commercial case'?
- Would the initiative be financially affordable – the 'financial case'?
- Would the initiative be achievable – the 'management case'?

Not all of these 'lenses' are equally relevant at the exploratory stage of a project such as this, nevertheless the Foundation sought to test the evidence and the thinking against all five by considering the 'strategic outline business case' for a Road Collision Investigation Branch. While the precise form – scale, budget, location, powers – of an RCIB span many options, we based our assessment on the case for establishing a single branch that has the same legal protections as the three existing branches in the UK, although in complement and constitution there would likely be several differences in practice. Worthwhile results could, arguably, be achieved from establishing some investigatory mechanism short of this – such as a dedicated grant to police forces to fund and share analytical activity – but we can see no better, or more obvious, option to test, particularly given the importance of any investigatory branch needing legal protections.

5.1 The strategic case

The road safety problem that faces the country is that, after having led the world in reducing death and serious injury for some considerable time, there has of late been a flatlining in casualty reduction, particularly for fatalities. Our roads may still be amongst the safest in the world but, even with restricted travel due to the Covid-19 pandemic and thus reduced traffic, we have still seen around four people die on our roads every day – *Reported Road Casualties GB, results (2021)*¹⁹ states that there were 1,460 reported road deaths in 2020. Clearly, going further is going to take some fresh thinking – the safe system approach²⁰ has clear merit, but the Foundation would argue that whole sociotechnical system²¹ thinking is also necessary as a complement to the safe system, involving a deeper and broader dive into cause and a wider perspective on all the possible bodies with a role to play in crafting and delivering interventions.

Creating a body that has that role and perspective would have a good fit with the Department's strategic policy priority to see our transport networks, including our roads, made safer.

The procedures to be followed by police investigations of fatal and serious road traffic collisions is set by College of Policing Authorised Professional Practice (APP) *Investigation of fatal and serious road collisions*²². APP states that the police are the lead agency for collision investigation and have the primary duty to investigate and establish the circumstances that have led to road deaths and life changing injuries. The police must discharge their responsibilities to the coroner, the wider judiciary and family members. The investigation provides an explanation to family and friends of what has happened to the deceased and/or seriously injured.

APP says that the police investigation should also be used to identify preventative measures to reduce further deaths and serious injuries on the roads. Reference is made to the NPCC *Policing Our Roads Together' 3 Year Strategy*²³. This strategy states that police will ensure collisions are responded to, reported and investigated effectively²⁴. APP identifies that an officer performing the role of Lead Investigator (LIO) has overall responsibility for management of the investigation. The role of Forensic Collision Investigator (FCI) and Lead Investigator are separate, requiring different skill sets and experience. Lead investigators should ensure that longer-term prevention, intelligence and enforcement opportunities, with regard to wider road policing and road safety issues, are identified and shared.

19 DfT (2021). *Reported road casualties Great Britain, annual report 2020*. Department for Transport. Accessed 14 April 2022 from <https://www.gov.uk/government/statistics/reported-road-casualties-great-britain-annual-report-2020/reported-road-casualties-great-britain-annual-report-2020>

20 The WHO states that "The Safe System approach aims to ensure a safe transport system for all road users. Such an approach takes into account people's vulnerability to serious injuries in road traffic crashes and recognizes that the system should be designed to be forgiving of human error. The cornerstones of this approach are safe roads and roadsides, safe speeds, safe vehicles, and safe road users, all of which must be addressed in order to eliminate fatal crashes and reduce serious injuries". WHO (2021). *Road Traffic Injuries*. WHO. Accessed 14 April 2022 from <https://www.who.int/news-room/fact-sheets/detail/road-traffic-injuries>

21 Stanton, N.A. (2019). *Models and Methods of Collision Analysis: A guide for policy makers and practitioners*. RAC Foundation. Accessed 14 April 2022 https://www.racfoundation.org/wp-content/uploads/Models_and_methods_for_collision_analysis_Stanton_March_2019.pdf

22 College of Policing (2013). *Road Policing: Investigation of fatal and serious injury road collisions*. College of Policing. Accessed 14 April 2022 from <https://www.app.college.police.uk/app-content/road-policing-2/investigating-road-deaths/?highlight=authorised%20professional%20practice%20in%20investigation>

23 NPCC (2018). *Policing our Roads Together: A 3 year strategy 2018-2021*. NPCC. Accessed 14 April 2022 from <https://library.college.police.uk/docs/appref/Policing-our-Roads-Together-partners-copy.pdf>

24 PoliceUK (2018). *NPCC Roads Policing Strategy*. PoliceUK. Accessed 14 April 2022 from <https://www.police.uk/advice/advice-and-information/rs/road-safety/npsc-roads-policing-strategy/> NB we are aware a refreshed strategy is in production

However, RCIP investigators have uncovered multiple factors that were not pursued by police because they were not relevant to a prosecution, or police resources were simply too stretched by other priorities. Only subsequently have RCIP investigators been able to go on to look for underlying factors, patterns of recurrence and possible gaps in regulatory frameworks.

Police forces vary in the way they are resourced and directed to investigate road deaths across the country. Illustrated in the 2017 RoadPeace report²⁵ *Road Death Investigation: overlooked and underfunded*, the level of resource and training that police forces dedicate to the investigation of road death is less than to other forms of homicide²⁶. Whether through lack of resources or simply working practices, police investigations tend to focus on establishing what happened and whether a person's actions amount to an offence – the identification of safety learning is not the focus of a police investigation. No criticism of the police investigation is made or implied by our findings – if an individual LIO or FCI does identify obvious safety learning then he or she will do their best to share this but, and this is the key issue, there is no clearly identified national process for them to do so or to enable a national, aggregated picture to be established.

5.2 The economic case

It would be all too easy to compare the relatively modest cost of establishing a team of investigators with the impact road death and injury has not just on individuals and their families but on society in general, plus the impact of traffic delay from collisions. But that would be to miss a big and inconveniently difficult uncertainty – that any RCIB would not only have to identify fruitful actions for others to pursue, but those bodies would have to be willing and able to pursue them, and they would have to result in the desired effect. This is about the potential for and likelihood of success, not a pinpoint forecast of what the creation of a RCIB would achieve.

To tease this apart, the project commissioned PA Consulting as our expert economic advisers, to take a twin-track approach:

Top-down – to outweigh the costs of its formation and the adoption of its suggested avenues of action how successful would the RCIB need to be to create a positive Cost:Benefit Ratio (CBR)?

- To calculate the costs of a potential Road Collision Investigation Branch the analysis used as a baseline the RAIB. Consultancy costs were added based on the annual cost of the Road Accident In-Depth Studies (RAIDS) programme, currently run for the DfT by TRL;
- The cost of implementing interventions was modelled on interventions that emerged from the work of the RCIP investigators, adjusted to allow for the fact that these ranged from new regulatory measures through to a re-direction of existing spend (e.g. on highway maintenance-related activities);

²⁵ RoadPeace (2017). *Road Death Investigation: overlooked and underfunded: Report summary*. RoadPeace. Accessed 14 April 2022 from <https://roadpeacejusticewatch.files.wordpress.com/2018/04/roadpeace-road-death-investigation-report-summary.pdf>

²⁶ Resourcing constraints have been looked at in the recent Road Policing Review which is due to report shortly.

- The benefits were calculated based on the number of Killed and Seriously Injured (KSIs) casualties each recommendation would be expected to save multiplied by the DfT value of a prevented casualty, published in 2019²⁷. This was completed to derive a monetary value, taking account also of the point from which such savings might accrue, recognising that it would take time for a RCIB to be established, investigate, draw conclusions, make recommendations and have those recommendations implemented.

Bottom-up – based on the limited number of cases explored through the project, looking also at the output from the other AIBs, and at international examples, how confident could we be that worthwhile avenues and interventions would be identified by such a branch, and be pursued, such that the economic benefits in terms of collisions avoided and mitigated would outweigh the costs?

- This is necessarily a more subjective assessment, informed in large part by the extent to which existing domestic and overseas investigative authorities were identified as having been the instigators of successful change, but also of a consideration of the findings of the RCIP investigations which were subject to peer review. Examples included removal of roadside obstacles that a vehicle could collide with if a driver loses control causing major/fatal injuries, retrofitting all 'P1' ramped-end terminals anchoring crash barriers with the safer 'P4' design, and commissioning an awareness campaign on insulin management on road safety through appropriate bodies.

A series of scenarios were run which revealed that the majority fell in the very high value for money (VfM) category in terms of Benefit Cost Ratios (BCRs) and also had a high Net Present Value (NPV). If a RCIB's activities only achieved annual reductions of KSIs and delay by 0.5% and 10% respectively, it would still likely yield very high BCRs. Even if a RCIB achieved minimal changes to KSIs, the case for its creation was still strong. The break-even scenario showed that a RCIB would need to achieve an annual reduction of only 0.028% in KSIs and 0.032% in traffic delay, depending on the year that the benefits are realised, to achieve a BCR of 1.

It is worth noting here that beyond the road safety and road congestion benefits of collisions avoided and mitigated, there are emissions benefits arising from reduced collision-related congestion and health benefits if safer roads led to more active travel that the project did not attempt to quantify.

5.3 The commercial case

We do not consider the Commercial case to be a significant issue because the unit would be a wholly-owned part of DfT as are the other AIBs. Commercial relationships

²⁷ We are aware that the calculations pre-date the very latest TAG guidance which can be found here: DfT (2021). TAG UNIT A4.1. *Social Impact Appraisal. Transport Analysis Guidance (TAG)*. Department for Transport. Accessed 14 April 2022 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1007447/tag-unit-a-4-1.pdf?mscl_kid=371da0faa84211ec82c64f70233054de

with suppliers would clearly need to be explored, but the existence of the RAIDS contract with TRL suggests that technical advisory and research bodies do exist and could be commissioned to provide the supporting analysis that a RCIB would need, if it decided not to resource the completion of this work in-house. It would be for the Department to decide what form of monitoring and evaluation plan should be put in place and by whom that work would be done, presumably on a similar cycle to whatever arrangements the Department wishes to make in respect of the existing AIBs.

5.4 The financial case

As noted above, for the purpose of the Economic case we have based the costs of running the RCIB on the RAIB. There is more work to be done on the detailed structure of the branch, but we think that adding the annual running cost of the RAIB together with the annual cost of the Road Accident In-Depth Studies contract is a reasonable starting point, and suggests an annual running cost in the region of £7m, subject to the assumptions that might be made on shared administrative support with the existing AIBs, a budget which would not be out of step with other international bodies. This does not strike us as an unaffordable sum in the grand scheme of DfT's annual resource budget.

Beyond the running costs of the branch there would be the costs of implementing its recommendations. At this stage these are hard to quantify, in particular whether they would fall as net additional costs to national or local government, businesses or individuals, or to what extent they might be absorbed by retuning existing funded programmes. We note three points:

- while not all of the costs are likely to fall on Government, some undoubtedly would, and that is an inevitable product of creating a body with a role to identify who, from a very wide list of players, has the clearest responsibility to act;
- based on the work that has been done by the RCIP Investigators, many recommendations are likely to be about refining and refocusing existing activity, such as road police deployment, targeting of local communication campaigns by road safety partnerships, running campaigns under the THINK! Programme, or work internationally to improve vehicle design standards;
- some actions may relate to the design, maintenance and renewal of highway infrastructure (including verge management and associated technologies such as signals and lighting) that could be incorporated into highway authorities' maintenance and renewal programmes.

Our conclusion under the financial case, taking into account the potentially wide range of implementation costs for recommendations, is that the cost and consequences of creating a RCIB do appear to be affordable.

5.5 The management case

We have considered the management case under two headings.

Establishing a branch

There is recent precedent for the task of establishing a new branch with the establishment of the RAIB. It is clear from our discussions with the existing AIBs that the DfT would have good access to the lessons learned from those involved in setting up the RAIB and would benefit from the enthusiastic co-operation of those branches, as demonstrated in a recent workshop we hosted in February 2022.

The primary legislation for the establishment of the RAIB was the Railways and Transport Safety Act 2003 and covered the necessary provisions in 14 sections, while the Railways (Accident Investigation and Reporting) Regulations 2005 cover the operational detail in 17 sections and 6 schedules. Some work would clearly be needed to establish the extent to which there might be overlap – synergies – with the provisions needed to implement the Law Commissions' recommendations, which we suspect will turn out to be considerable. We have provided DfT with an analysis of the legal powers likely to be required for a successful RCIB, prepared by Winston Rasaiah, with informal advice sought from the DfT legal team.

There may be some limited potential to move swiftly, in advance of legislation. Options might include starting to create the analytical capability a RCIB would need, identifying a high-profile chair who might work to help shape the structural decisions.

However, advice from those involved with the establishment of previous AIBs is to focus more on the swift establishment of the branch, putting relevant arrangements in place with appropriate bodies (other AIBs make extensive use of agreeing memorandums of understanding with partner organisations such as the police), identifying the skillsets needed, and exploring ways to accelerate the legislative process, possibly by twin tracking the drafting of primary legislation and the secondary implementing regulations. A key learning point from the RAIB experience is to establish a clear common understanding of how swiftly a branch might be fully up and running once the relevant powers are in place – on day one the key tasks facing a new chief investigator might well be recruitment of a workforce and award of supporting contracts rather than immediate commencement of investigations.

Operation

There are three issues here. The first is to ensure that a RCIB would work to complement, not duplicate, or obstruct existing investigative bodies. Other AIBs manage this through establishing memorandums of understanding that set clear expectations on who is to be responsible for what.

The second is how the RCIB might best target its investigative activity. Any future RCIB would need to establish an approach for targeting in-depth investigation, given that there are so many fatal and serious road collisions in Great Britain, running well into the thousands²⁸. The steer we take from international experience is that cases selected for investigation should be chosen based on whether they are deemed to constitute a major incident (i.e. a certain number of fatalities or certain vehicle types involved), whether the collision is of interest as part of an active thematic investigation (i.e. of identified at-risk groups such as motorcyclists, pedestrians, older drivers, business drivers etc), and, in particular, the potential scope they offer for safety learning.

Comparing the likely balance of activity between a RCIB and the existing domestic AIBs we suspect the balance of activity may be more on the exploration of national trends than individual incidents (other than as examples of a particular thematic issue). The existing AIBs' reports and recommendations are subject to rigorous peer review in which the practicability as well as the potential efficacy of options is tested to the full, and that is very much how we would expect a RCIB to work.

We recognise that the very nature of road use makes it a highly challenging environment in which to identify and implement safety recommendations, because rather than involving a limited number of companies it encompasses so many players, including tens of millions of drivers, riders and pedestrians, and the decisions they make as they travel. Nevertheless, there are sound reasons for believing that safety improvements are possible based on the performance of the existing branches and the amount of safety learning that has emerged from the RCIP.

In 2020, the RAIB conducted 16 investigations, and made 61 recommendations²⁹. The AAIB published 30 field and 199 correspondence investigation reports, which included 30 safety recommendations³⁰. The MAIB started 19 investigations in 2020, 42 recommendations were issued and 29 were addressed³¹. We would expect a RCIB to be of a similar scale.

On the issue of consultancy, the Department would need to come to a view on the extent to which existing contracts, such as the RAIDS, might migrate in some form to a RCIB. For simplicity we have based the consultancy budget estimate for the RCIB on the presumption that RAIDS, because of the strong automotive design content, would transfer, or at least represent the scale of consultancy cost needed to buy in the requisite expertise.

28 DfT (2021). *Reported road casualties in Great Britain, annual report: 2020 annual report*. Department for Transport. Accessed 14 April 2022 from <https://www.gov.uk/government/statistics/reported-road-casualties-great-britain-annual-report-2020/reported-road-casualties-great-britain-annual-report-2020>

29 RAIB (2021). *RAIB summary of recommendation status 2020*. RAIB. Accessed 14 April 2022 from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/978909/RAIB_summary_of_recommendation_status_2020.pdf

30 AAIB (2021). *Annual Safety Review 2020*. AAIB. Accessed 14 April 2022 from https://assets.publishing.service.gov.uk/media/60d2e72ed3bf7f4bd4662d67/Annual_Safety_Review_2020.pdf

31 MAIB (2021). *Annual Report 2020: Marine Accident Recommendations and Statistics*. MAIB. Accessed 14 April 2022 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/992017/MAIBAnnualReport2020.pdf

6. Conclusions



Our conclusion is that an independent investigation body should be established to promote road safety.

Such a body should have very similar powers to the existing AIBs – importantly these should include the legal protections the other AIBs enjoy. It would need the capability to handle individual large scale or complex road collisions, including those involving vehicles operating under high levels of automation in accordance with the Law Commissions’ recommendations. We propose it should have an organisational and operational bias more toward thematic investigations, harvesting data from multiple sources to create a broader, richer picture – a ‘sociotechnical’ picture – that will enable policy makers and practitioners to successfully identify and tackle the causes of road casualties. This would clearly have implications for the staffing of the body in terms of the skills and experience needed, and for sourcing external expertise.

This project has benefited hugely from the close working we have enjoyed with other interested bodies, in particular the police, and we would recommend their continued involvement in working up the detailed design, powers and responsibilities of a new branch.

We would encourage National Highways to make full use of the digital twin tool created by Tonic Analytics in order to develop its own understanding of the causes and consequences of incidents on the strategic road network. And in the evaluation of those consequences we would urge the DfT to revisit and refresh the values ascribed to the impact of incident-related delay in its appraisal methodology.

This report documents what has been the longest and most comprehensive project the RAC Foundation has undertaken to date. While other projects have been broader in ambit – 2002's *Motoring Towards 2050* comes to mind – the publication of this report marks the culmination of a four year journey involving multiple agencies to attempt to answer a very specific question, one that has been hovering as part of the road safety debate for many years: whether there could be a positive cost:benefit to be found in developing a fresh way of investigating the causes of death, injury and collision-related disruption on our roads. Our answer to that question is not only 'yes', but that the fresh approach offering the best prospects would be based on the essential elements of the existing accident investigation branches, shaped to recognise the different characteristics of the road environment.

Our hope is that the DfT will now pick up from where this report ends - much detail remains to be worked through before a new branch in the form we are advocating could be established, but we think the case for so doing is clear, and we stand ready to help.

Annex A – Road Collision Investigation Project Steering Board members

Richard Auty, FCIN

Adam Barrow, TRL

Paul Bennett, National Highways

Elizabeth Box, RAC Foundation

Terry Collins, FCIN

David Davies, PACTS

Simon French, RAIB

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Richard Leonard, National Highways

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Winston Rasaiah, RAIB

Elizabeth Reed, DfT

Frances Senior, FCIN

Neville Stanton, Southampton University

Glyn Wallis-Jones, DfT

Jamie Williamson, DVSA

Katherine Williamson, DfT

Annex B – Project document list

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Safety Advice Notices

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