



# SAFETY & RELIABILITY SOCIETY AND UNIVERSITY OF HUDDERSFIELD

## RAILWAY SAFETY IN A PERIOD OF CHANGE

PROFESSOR GEORGE BEARFIELD  
UNIVERSITY OF HUDDERSFIELD

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27<sup>TH</sup> SEPTEMBER 2022

*University of*  
**HUDDERSFIELD**  
Institute of Railway Research

**SaRS** SAFETY  
AND  
RELIABILITY  
SOCIETY Slide 1

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# Programme

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SOCIETY

- Introduction
- Presentation by Professor George Bearfield
- Q&A session
- A bit about SaRS and accessing the webinar
- Feedback

Note: the Webinar is being recorded and will be publicly available

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# Railway Safety in a Period of Change



George Bearfield, Visiting Professor of Railway System Safety,  
University of Huddersfield, Institute of Rail Research

# What I'm going to say...

- GB Rail's strength has been its risk based approach to safety, the rigour and clarity of accountability in its legal framework and its safety culture and leadership.
- The industry excelled in its safety performance in a period of growth.
- GB rail cannot be complacent and allow the organisational principles on which it built its safety record be undermined by accidental change and uncontrolled evolution.

# Summary

- In fact, its going to need to be better to safely cope with the transformation and and cost challenges ahead.
- Major rail accidents have huge and debilitating effects and the risk has not gone away. The industry needs to be built to cope with them if they occur.
- Some strategic recommendations that should be considered in the transition to Great British Railways are set out.

# SAFETY IN THE PRE-PRIVATISATION RAILWAY

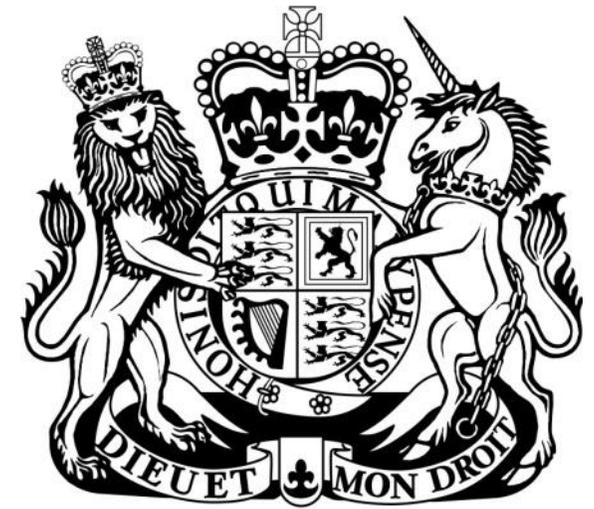
# Long Term Safety in Great Britain

## Fatal injuries to workers, Great Britain

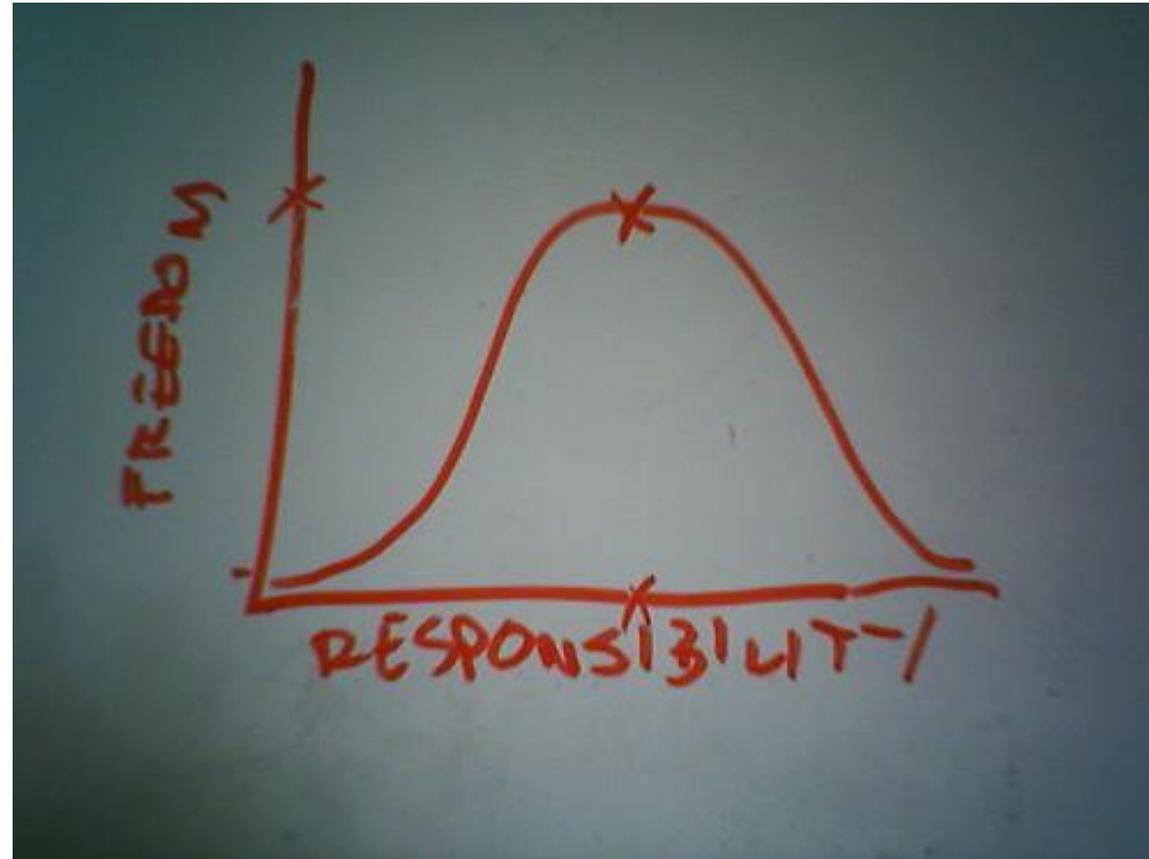
1981 - 2019/2020



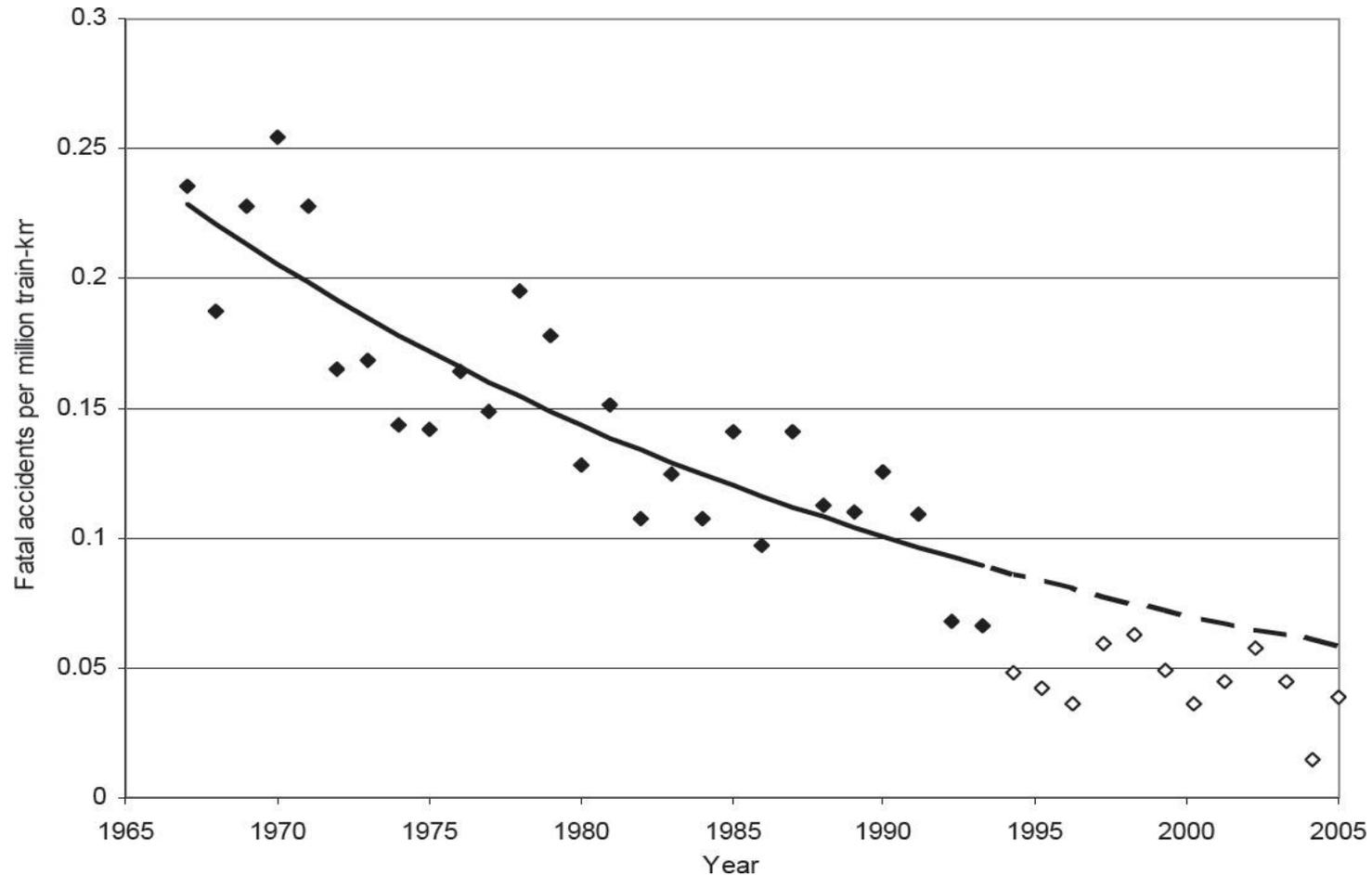
Source: HSE, RIDDOR, RIDHIST



# Long Term Safety in Great Britain



# The Story of Railway Safety in Great Britain



Fatal movement and non-movement accidents per million train-kilometres, 1967–2005

Significance, Volume: 4, Issue: 1, Pages: 15-18, First published: 02 March 2007, DOI: (10.1111/j.1740-9713.2007.00213.x)

# Clapham Junction and the Hidden Report

- 12 December 1988, a passenger train crashed into the rear of another train just south of Clapham Junction railway station in London and then hit an empty train travelling in the opposite direction.
- A total of 35 people died in the collision, while 484 were injured.
- The collision was the result of a signal failure caused by a wiring fault.
- An independent inquiry was held, run by Anthony Hidden
- A range of findings – fatigue management, signalling testing and maintenance practices.
- Recommendation 48 of the Hidden Report refers to CBA as being used *“so that the cost-effectiveness of safe operation of the railway occupied its proper place in a business-led operation”*



# SAFETY AT THE TIME OF PRIVATISATION

- Secretary of State and the Regulator were both given responsibility for ensuring safety in 'exercising the functions'; needed to implement the Act
- British Railways Board Safety Validation processes (introduced following Hidden) was applied.

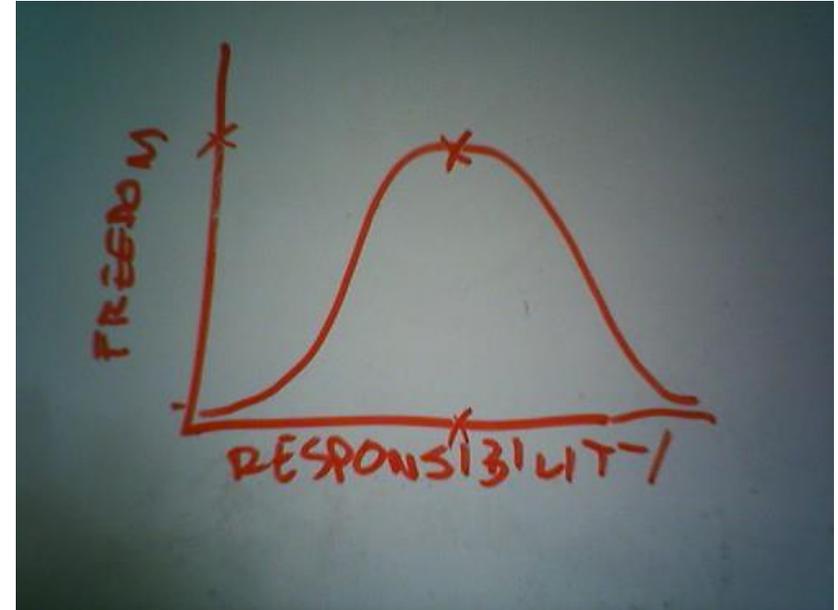




## Railways and Other Guided Transport Systems Regulations

19.—(1) A transport operator shall—

- (a) make a suitable and sufficient assessment of the risks to ... ensure safe operation of the transport system in question **insofar as this is affected by his operation...**”



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# Duty of Co-operation

- (1) Every person to whom this paragraph applies shall co-operate as far as is necessary with a transport operator....
- (3) Every transport operator shall co-operate...with any other transport operator...**where that other transport operator is taking action to achieve the safe operation of that transport system.**

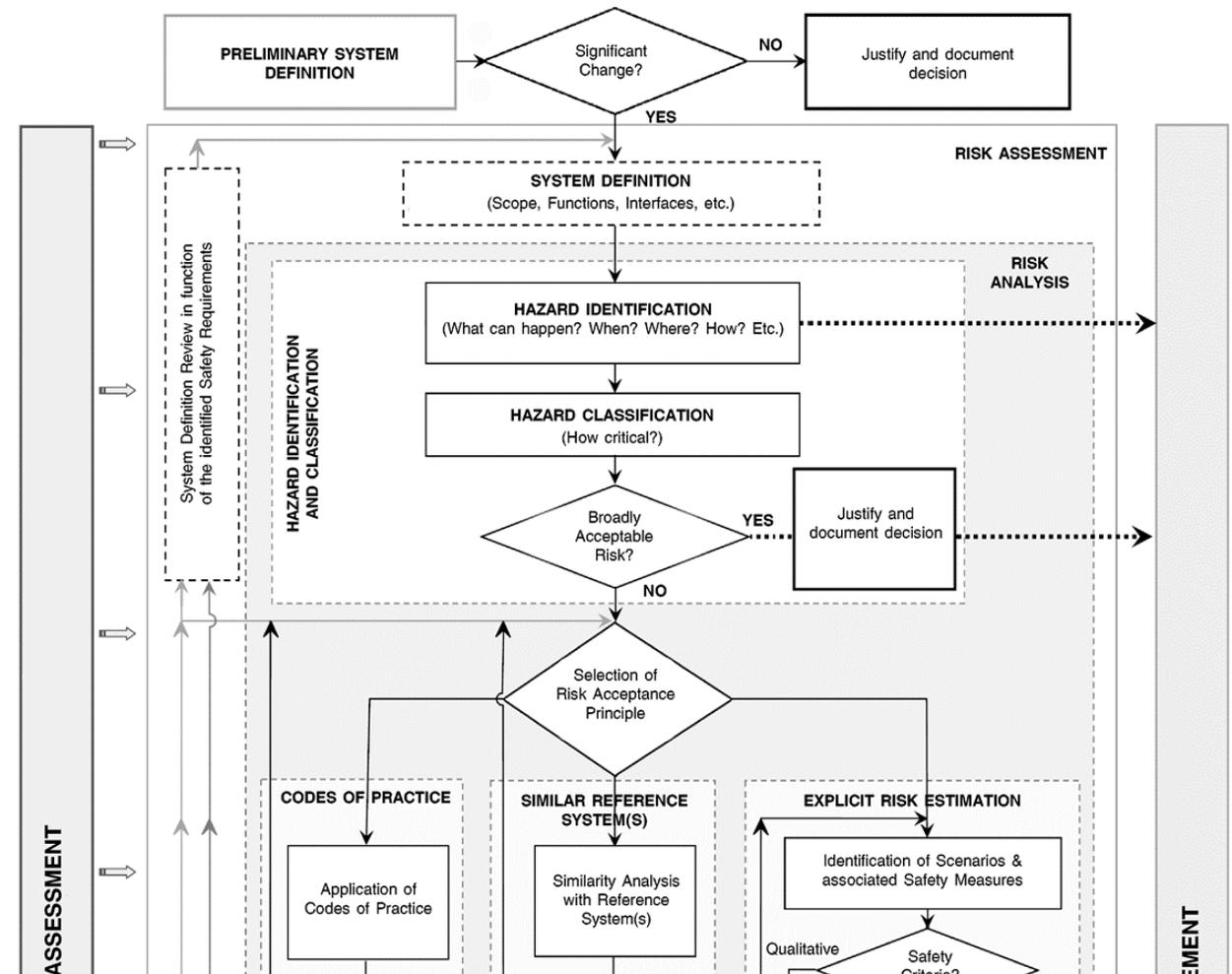


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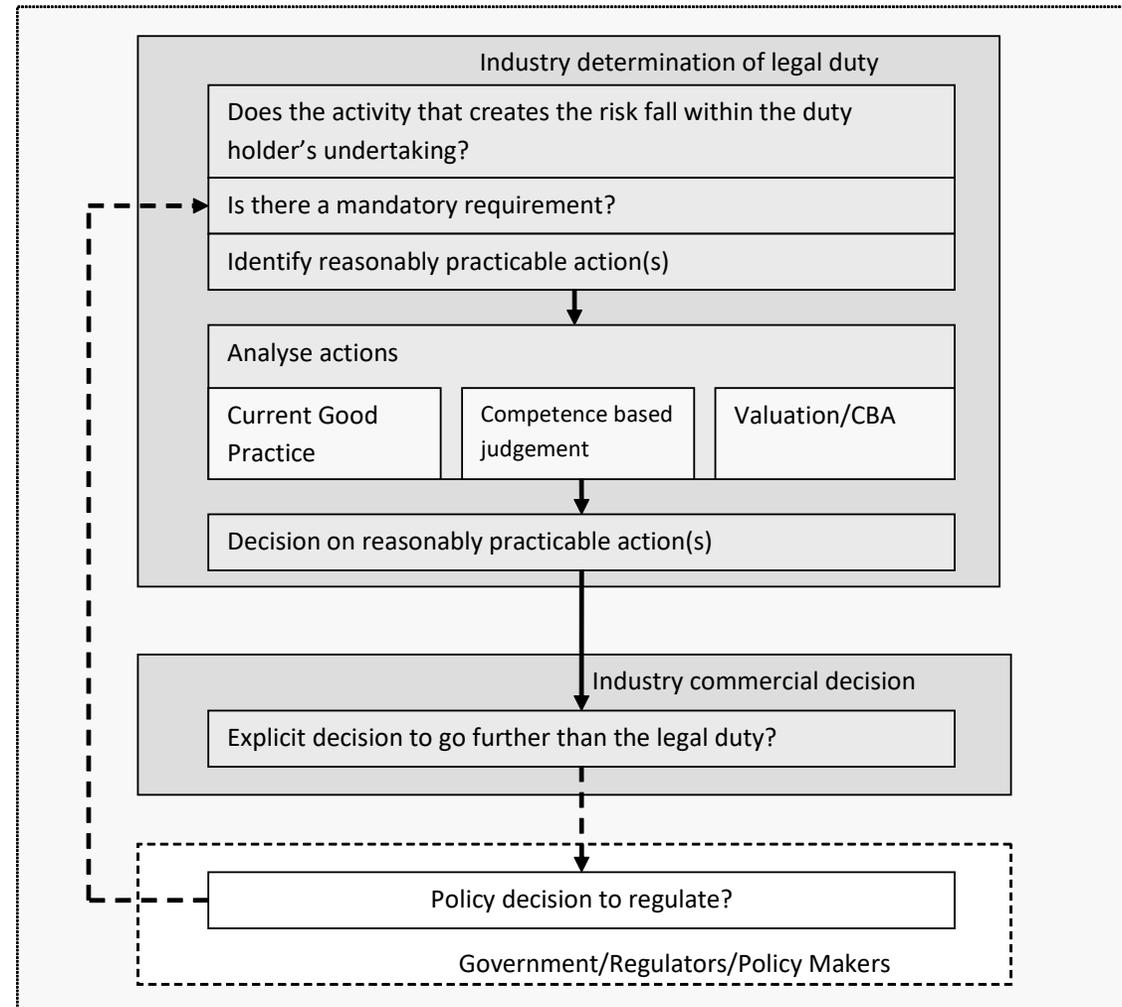
# Risk-based Approach: A Key Export to the EU

## Railway Safety Directive:

- “the responsibility for the safe operation of the...rail system and the control of risks associated with it is laid upon the infrastructure managers and railway undertakings, ***each for its part of the system...***”



# The Anatomy of a Safe Decision



The relationship between different decision criteria in the GB railway industry (source: Taking Safe Decisions).

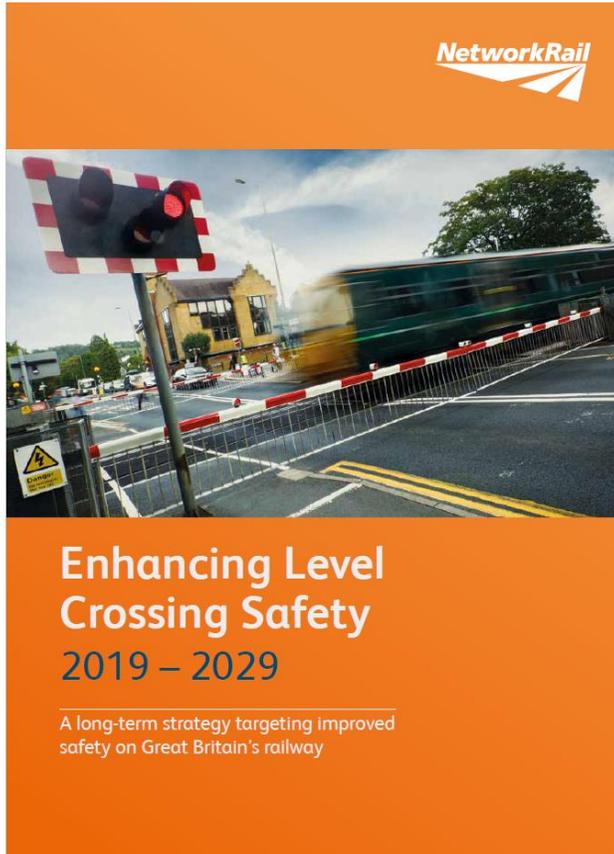
VPF: £2.1 million per statistical fatality averted

‘...where the cost [of the measure] is above the monetary value of the safety benefit [of the measure], we apply professional judgment in determining whether the cost is grossly disproportionate to the safety benefit and it is reasonably practicable to implement the improvement. In making this judgment, we pay particular attention to:

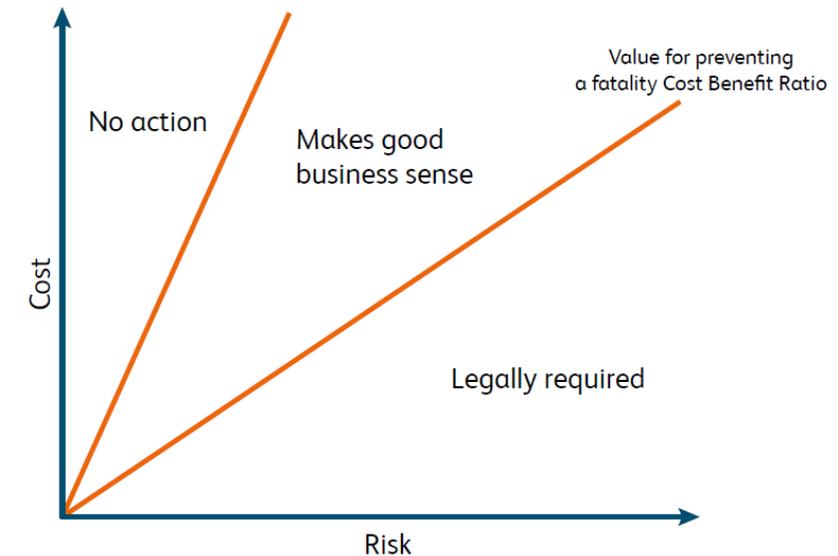
- the degree of uncertainty in the assessment of costs and safety benefits
- the range of potential safety consequences.



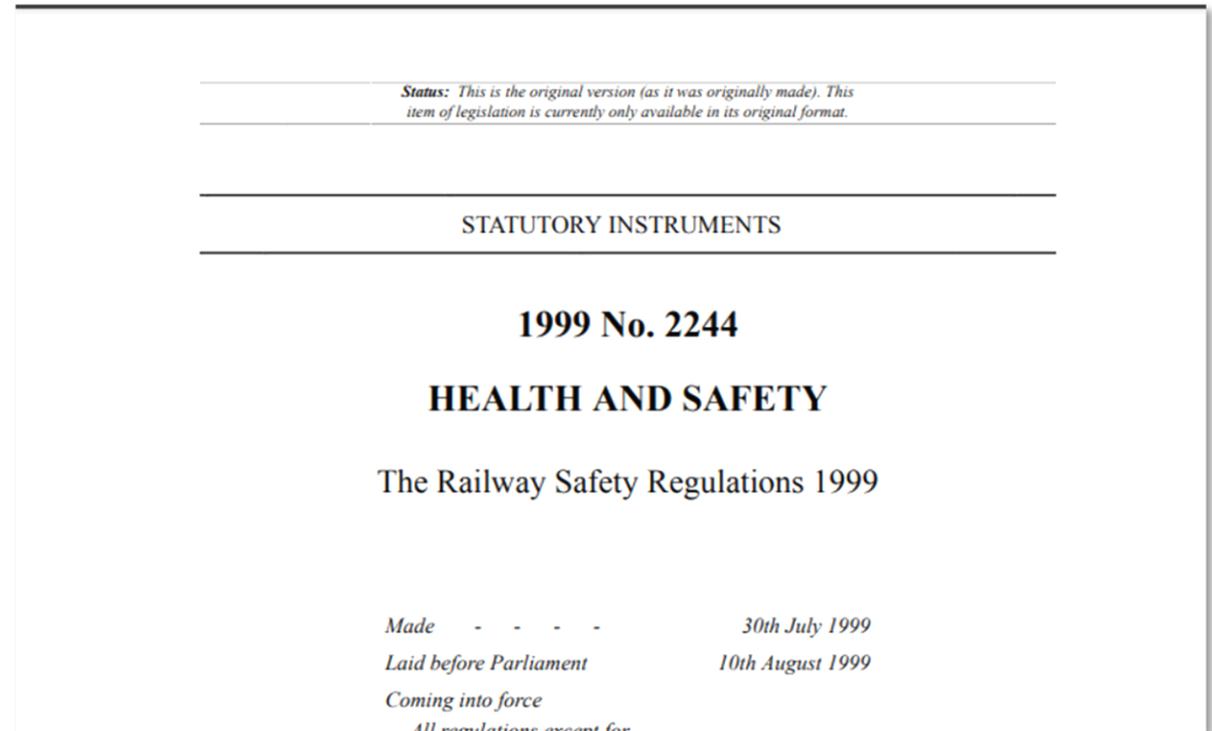
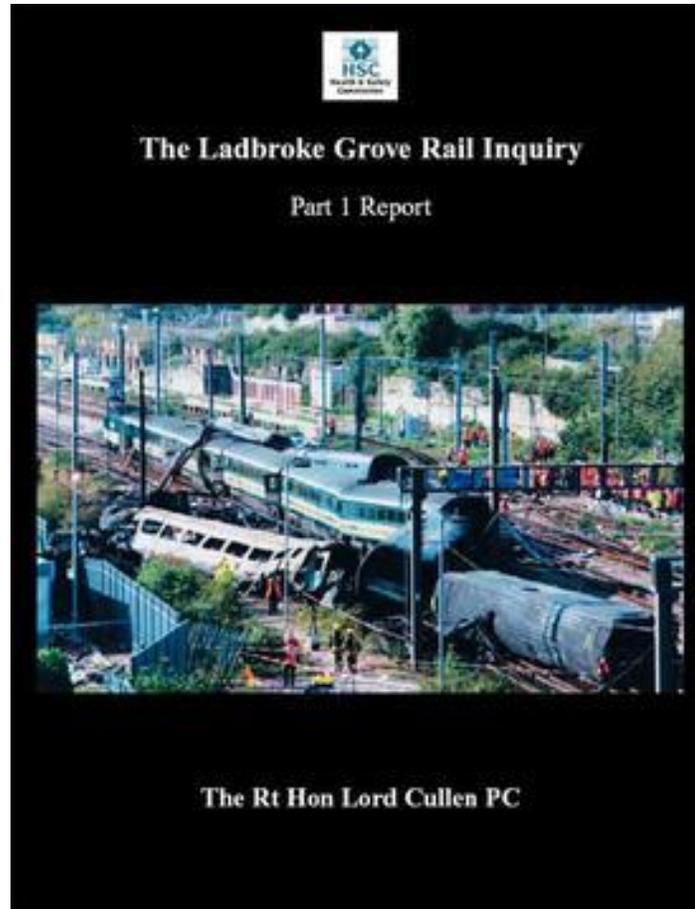
# An Exemplar: NRs Level Crossings Strategy



“As well as always **complying with the legal duties** placed upon us, there may be occasions when, for good business reasons, we decide to make changes to level crossings that provide further improvements for both passengers and public **which go above and beyond** what would otherwise be deemed ‘reasonably practicable’”

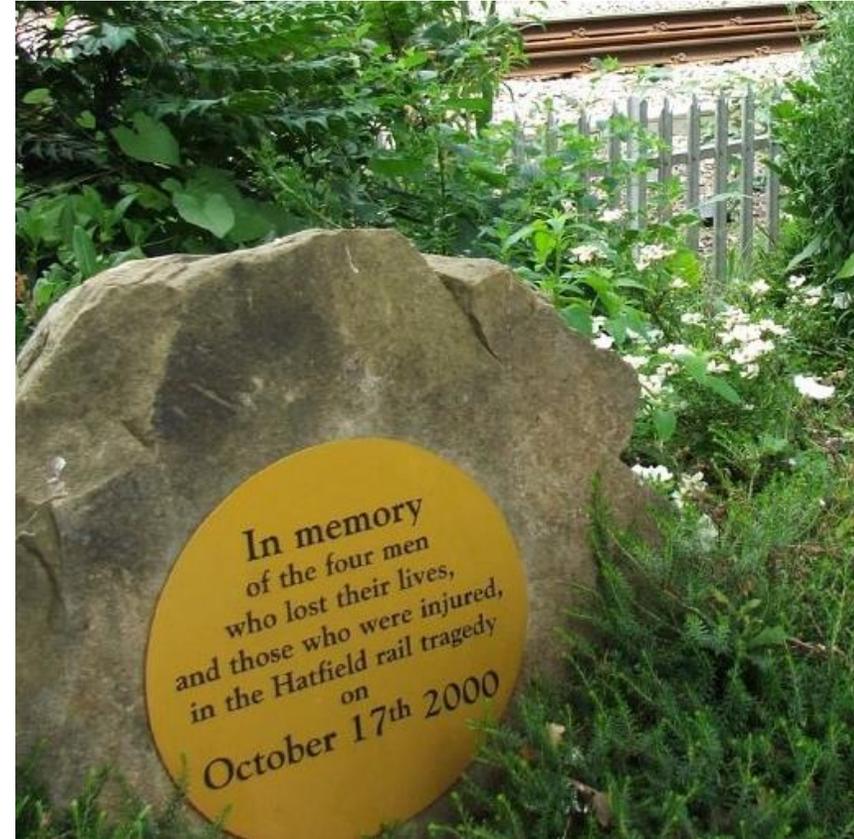


# Policy Decision to Regulate: An Example



# SAFETY AND RAILWAY COSTS CHALLENGES

# Hatfield – Overpressure

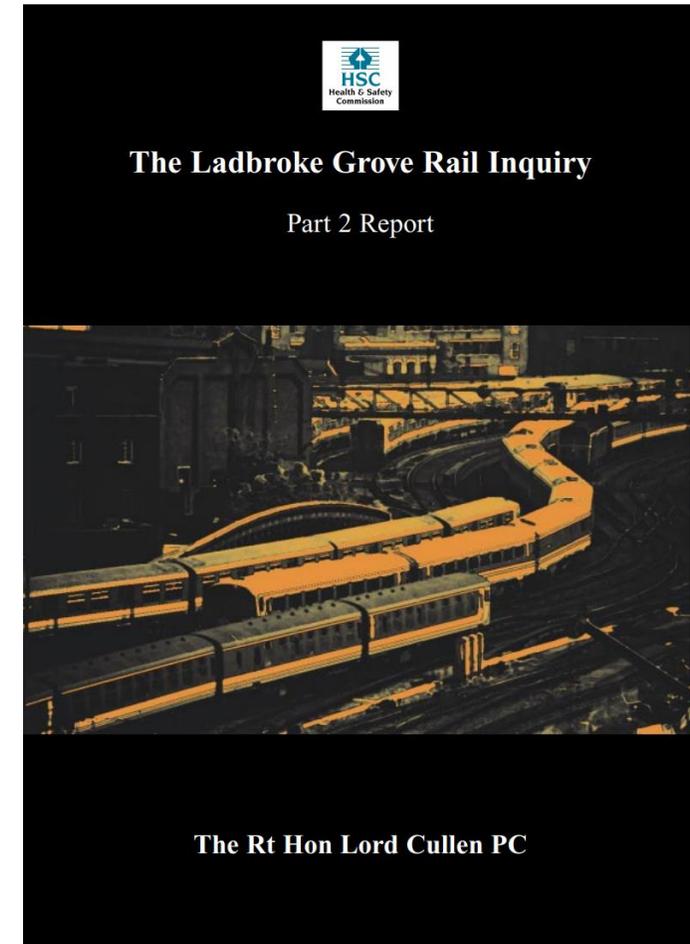


# Safety and 'Business' are Linked...

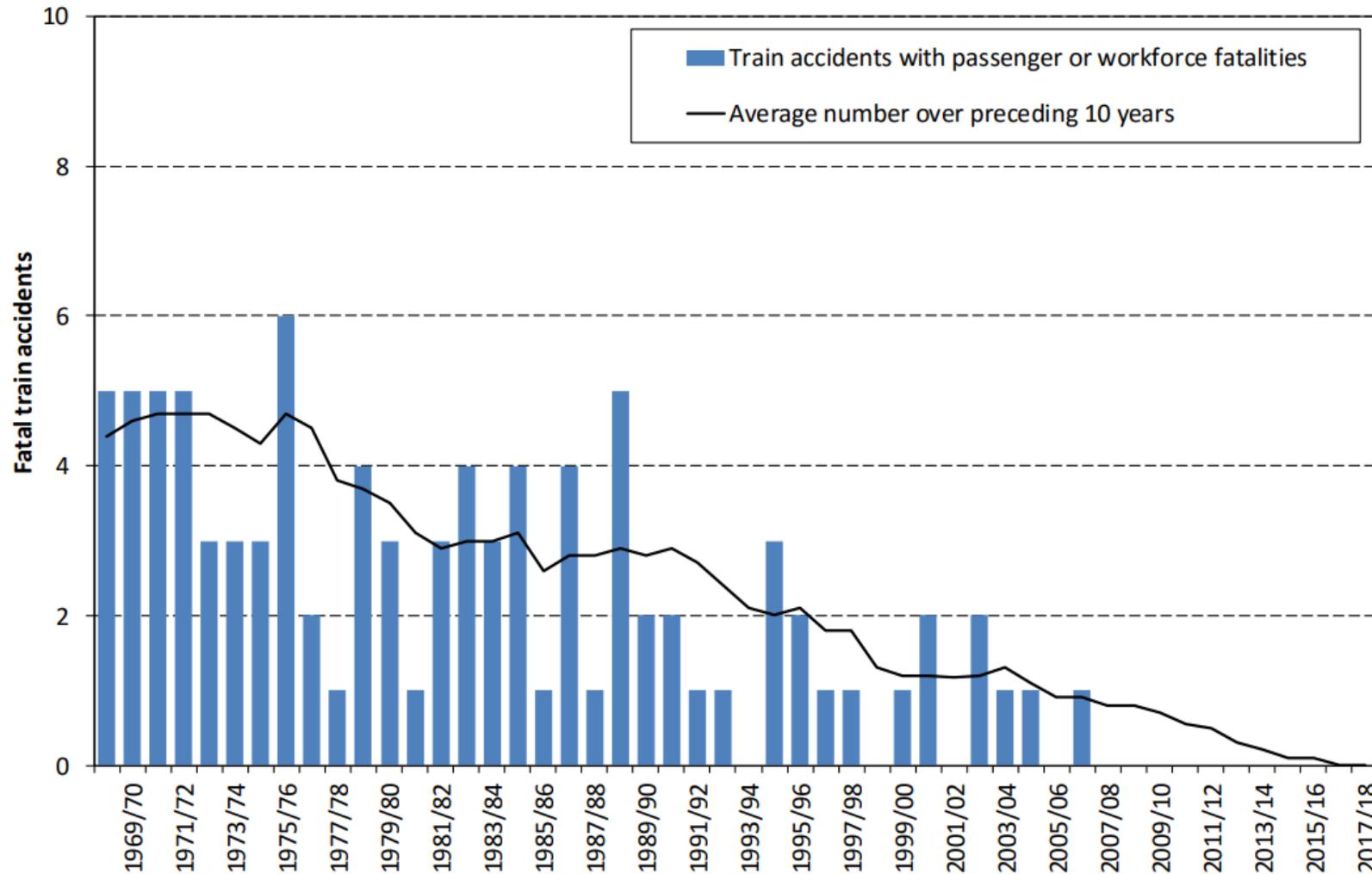
*"...It is clear, therefore, that there is a link between good safety and good business. The rigour and operating discipline of the processes which lead to good safety performance are exactly the same processes which deliver good operational performance, which in turn leads to good business.*

*There is no "trade-off" between safety and good business. As was said by the Rail Regulator: "...they are two sides of the same coin".*

Lord Cullen

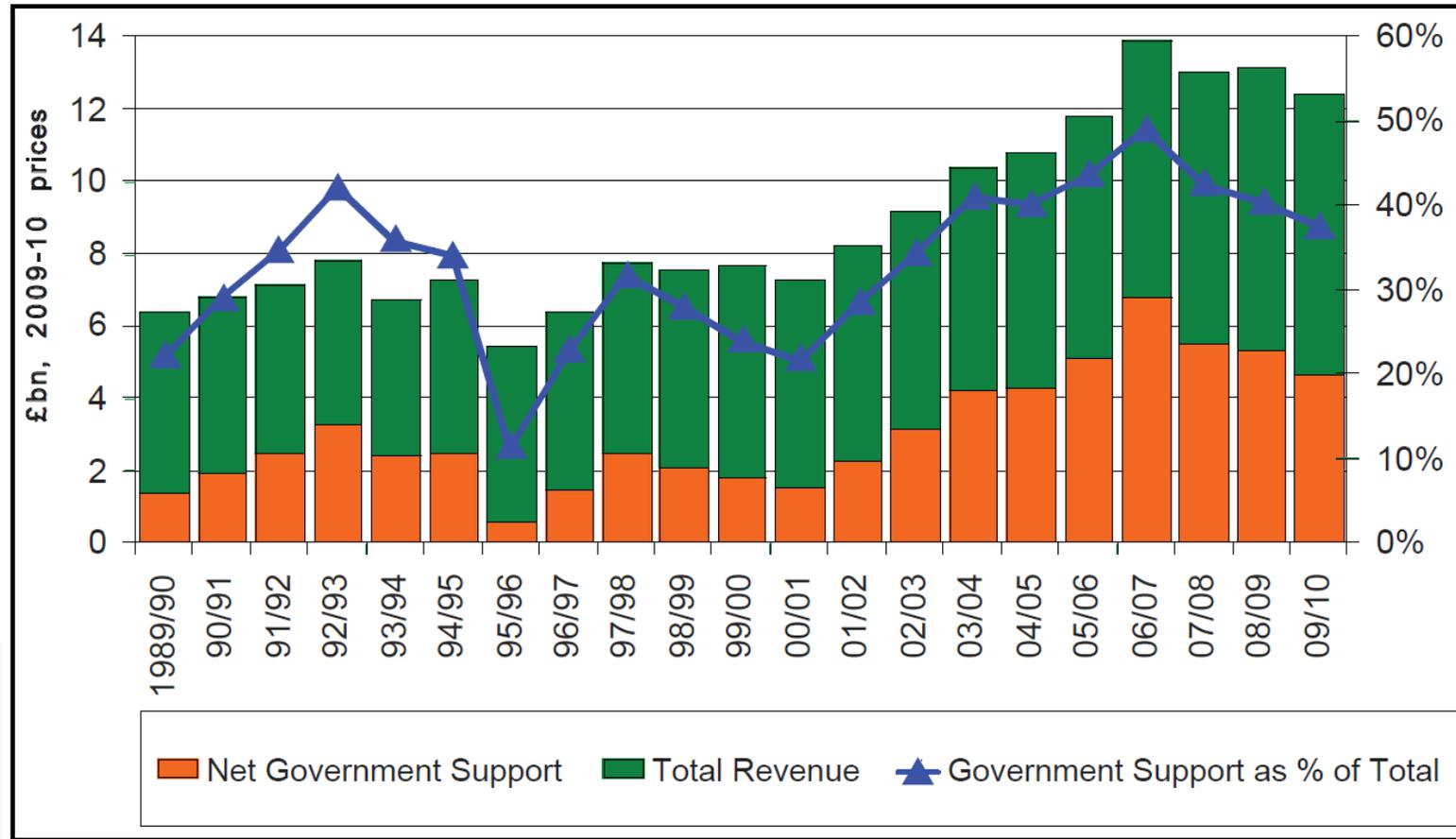


# While improving safety trends continue....



Source: RSSB  
Annual Safety  
Performance  
Report 2017/18

# ...Industry revenues and subsidy increase



Industry revenues and subsidy 1989/90 to 2009/10

Source: Realising the Potential of GB rail, Roy McNulty, National Rail Trends, DfT Statutory Accounts.

- To examine cost structure of the railway and propose how to reduce cost to taxpayer, while still growing and improving.
- Proposed strong collective industry leadership group.
- Less prescriptive franchises.
- Decentralisation of Network Rail – closer alignment with TOCs.
- More local decision-making

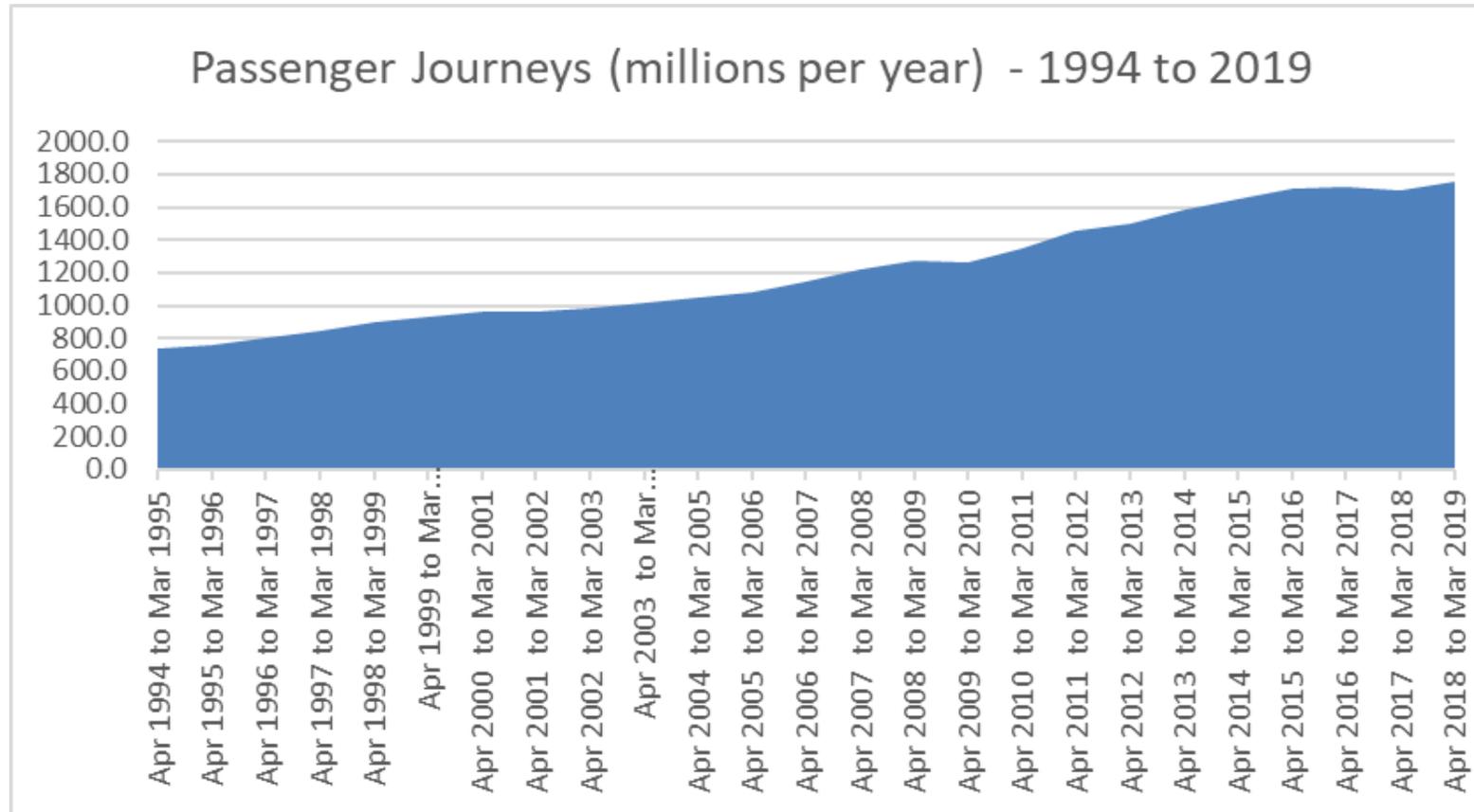
## Realising the Potential of GB Rail

Final Independent Report of the Rail Value for Money Study

Detailed Report

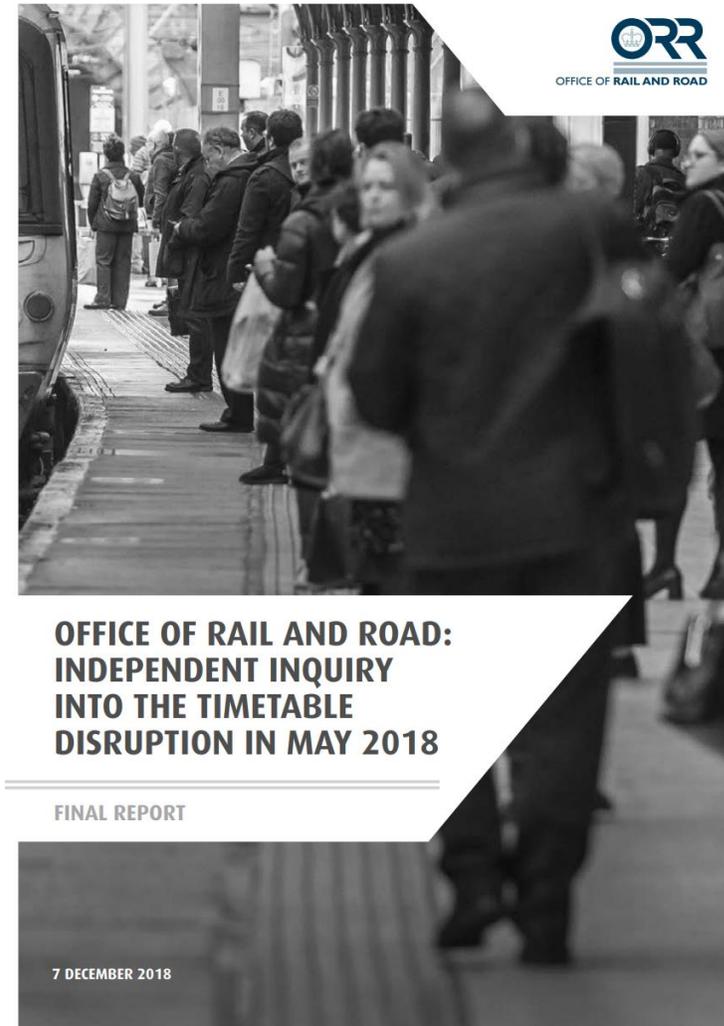
May 2011

# Revenue Plateau

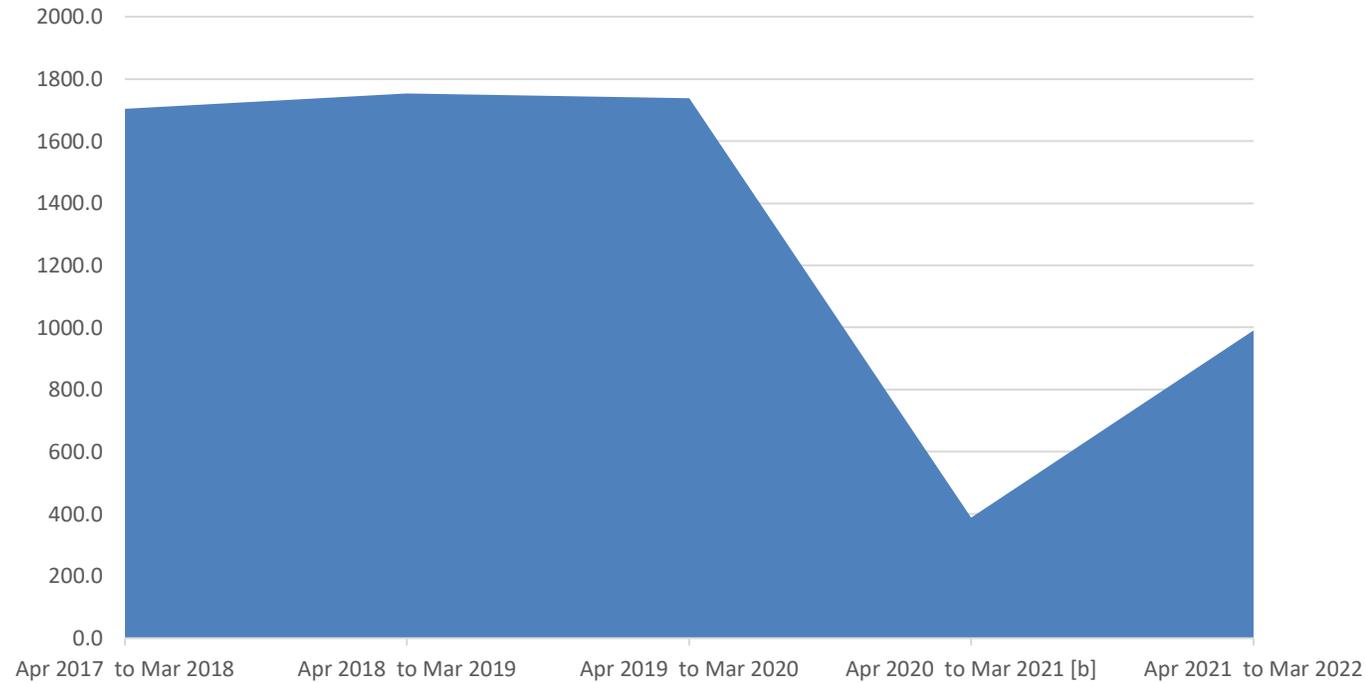


# Timetable Chaos

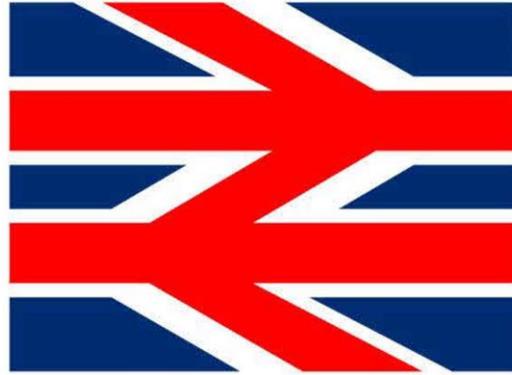
- “...the diffuse nature of accountability for these different programmes across the industry and government results in a lack of clarity about roles and responsibilities for the oversight and control of complex system risks...industry process needs to change to accommodate these responsibilities.



Passenger Journeys (millions per year) - 2017 to 2022



*There is no “trade-off” between safety and good business. As was said by the Rail Regulator: “...they are two sides of the same coin”.*



# GREAT BRITISH RAILWAYS

- New public body (NR, RDG, DfT)
- Owns infrastructure
- Receives fares revenue
- Runs and plans network
- Sets most fares
- Franchise system replaced by concessions for the operation of passenger rail services.
- The resulting Passenger Service Contracts in general place revenue risk with the Government.

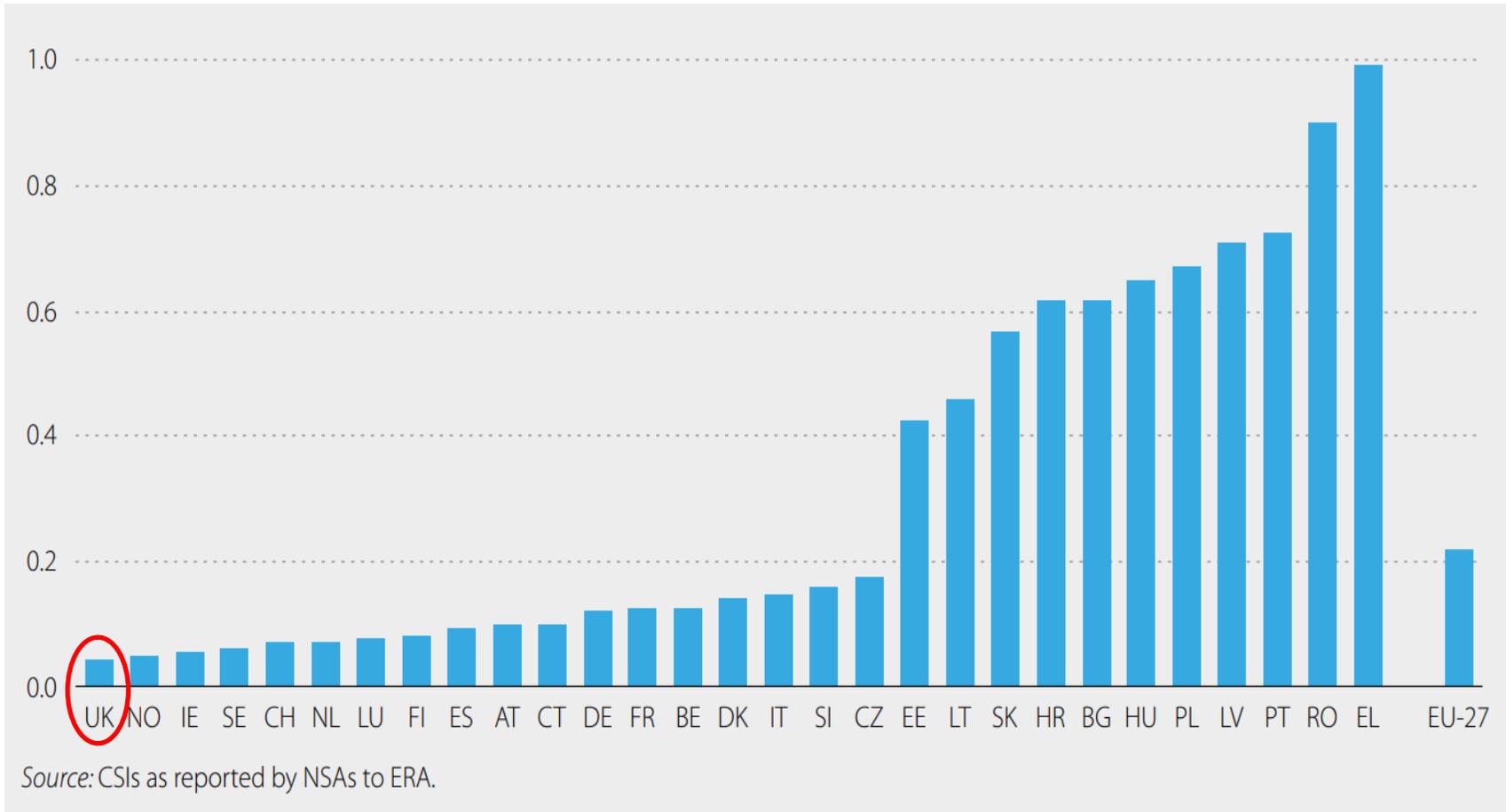




*“We will bring the railways back together, delivering more punctual and reliable services...This will mark the end of a quarter century of fragmentation.”*

*The Williams-Shapps Plan for Rail May 2021*

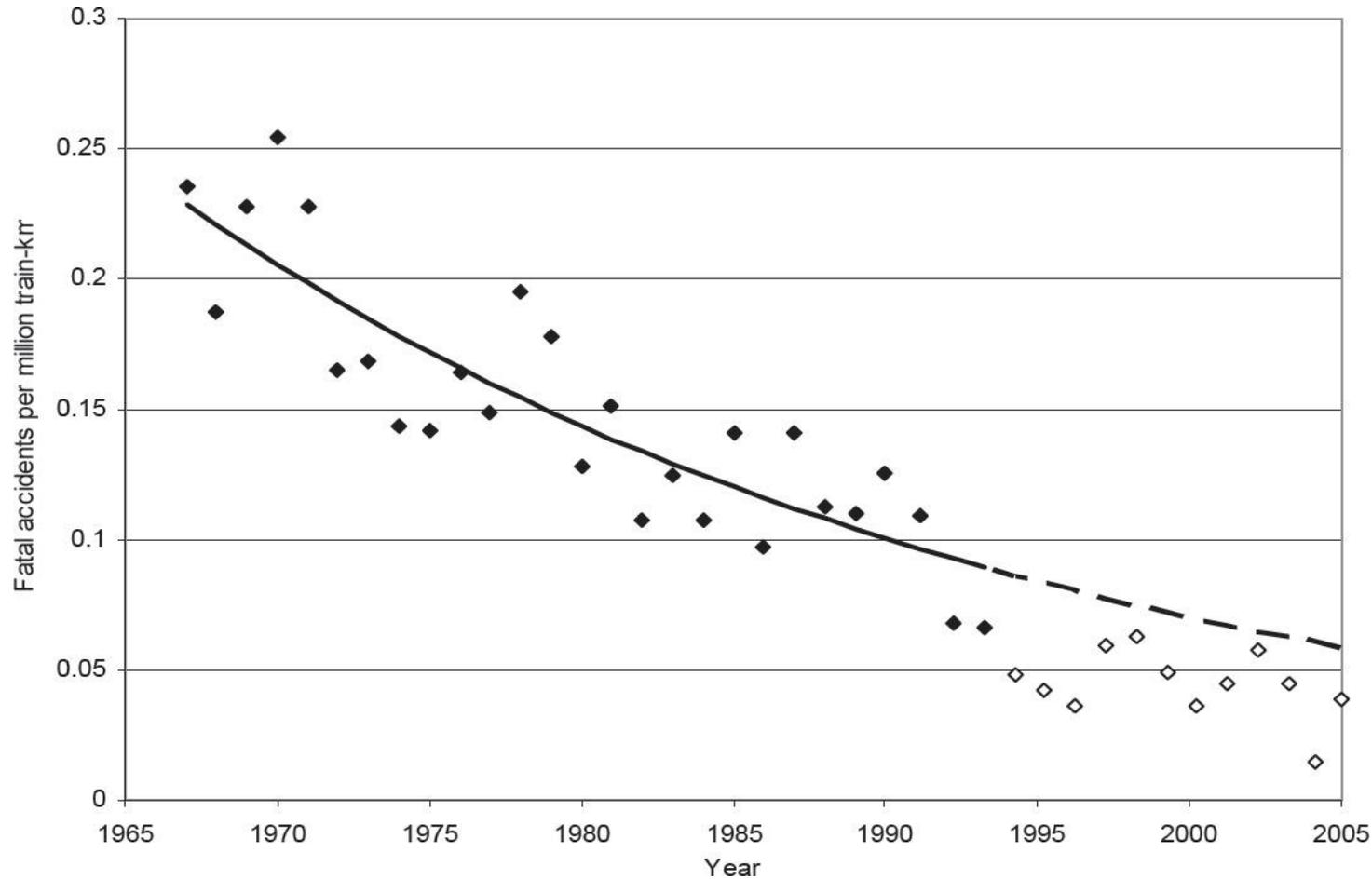
# Was 'fragmentation' bad for safety?



UK consistently the safest major railway in the EU - if not the safest overall – prior to UK departure from the EU.

2018-2020 figures from the European Union Agency for Rail

# Was 'fragmentation' bad for safety?

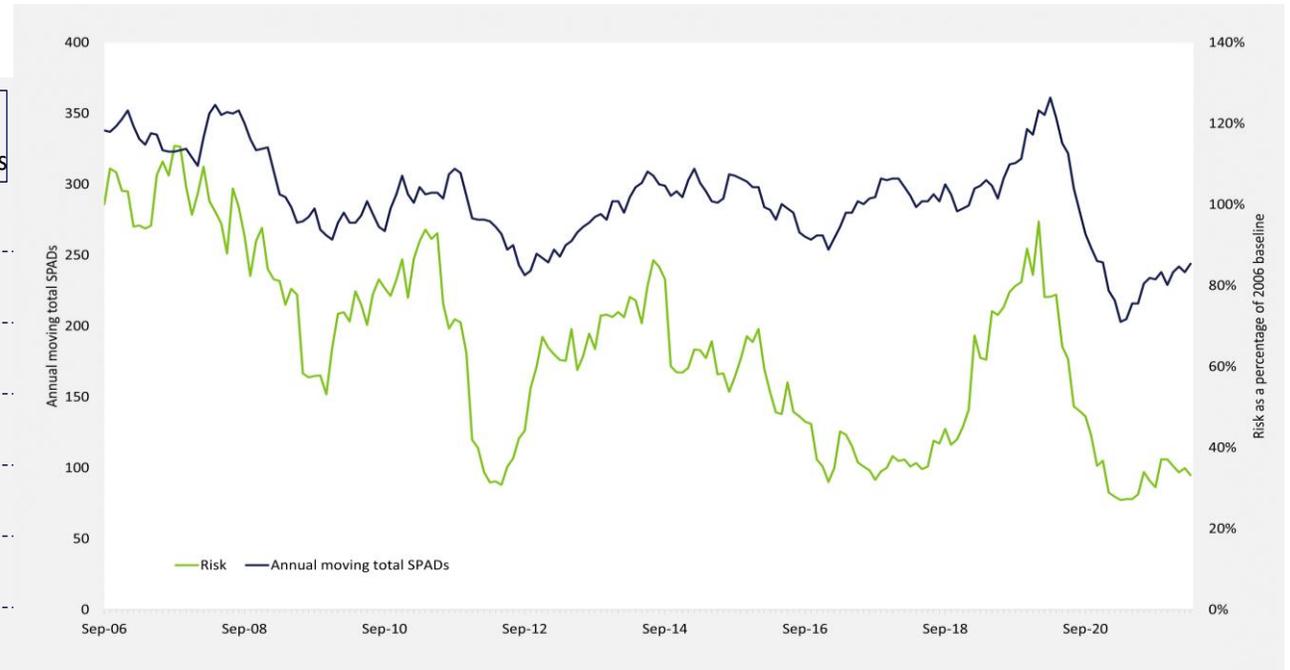
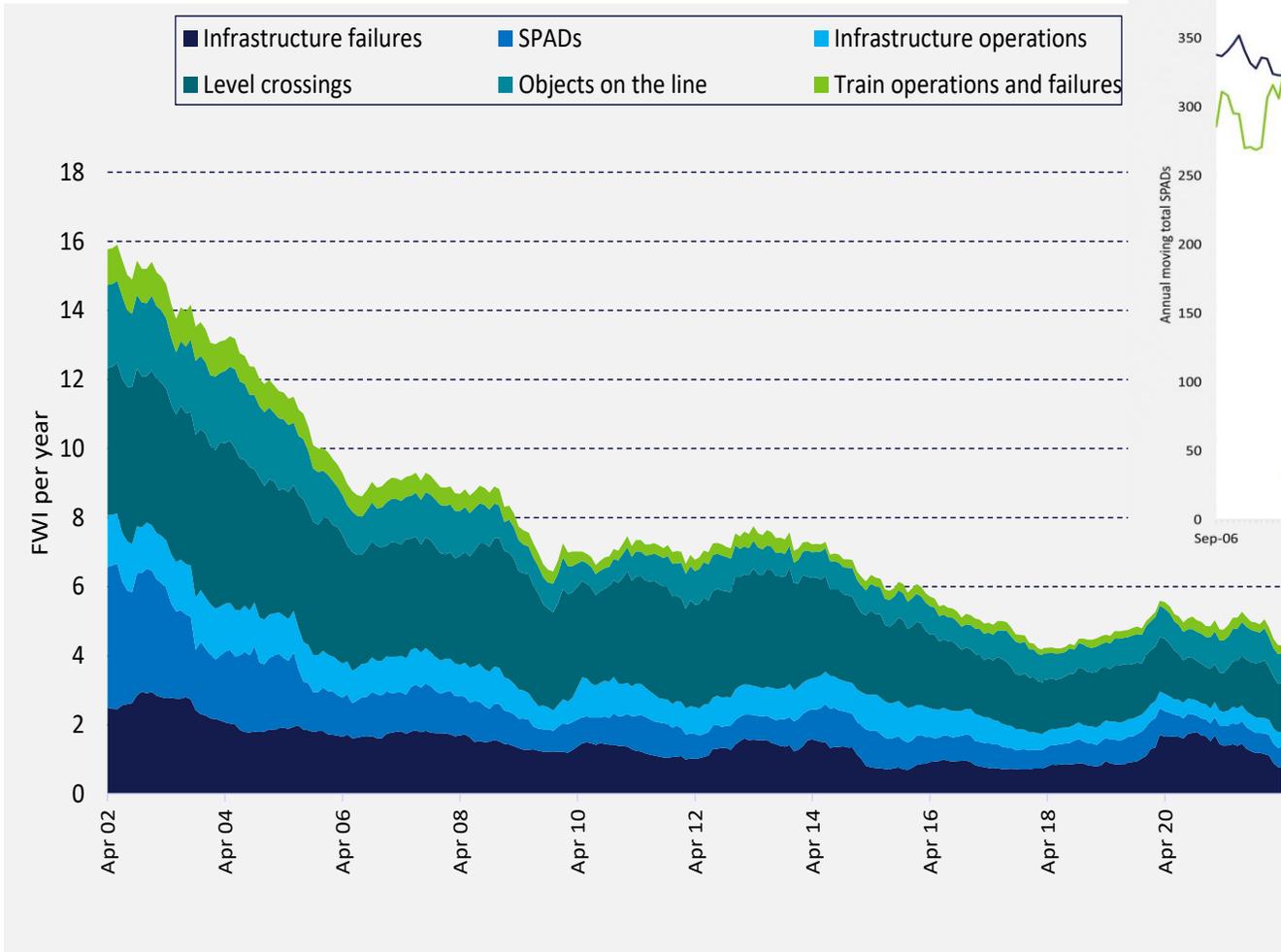


“The conclusion from the analysis of the accident data is that there is no evidence for the hypothesis that railway safety, as measured by accidents, has become worse since privatisation.”

Evans, A. W. (2006) Rail safety and rail privatisation in Britain. *Accident Analysis and Prevention*, doi: 10.1016/j.aap.2006.09.007.

Significance, Volume: 4, Issue: 1, Pages: 15-18, First published: 02 March 2007, DOI: (10.1111/j.1740-9713.2007.00213.x)

# Stubborn Residual Risks



# THE CHALLENGES

# 1. Clarity of Safety Accountability

- At the time of privatisation, accountability for managing the organisational change safety validation was clear.
- Now putting the industry back together again, the legal responsibilities sit at the company level.
- No one is clearly accountable for the whole industry safety validation...but the change has already begun.



# 1. Clarity of Safety Accountability



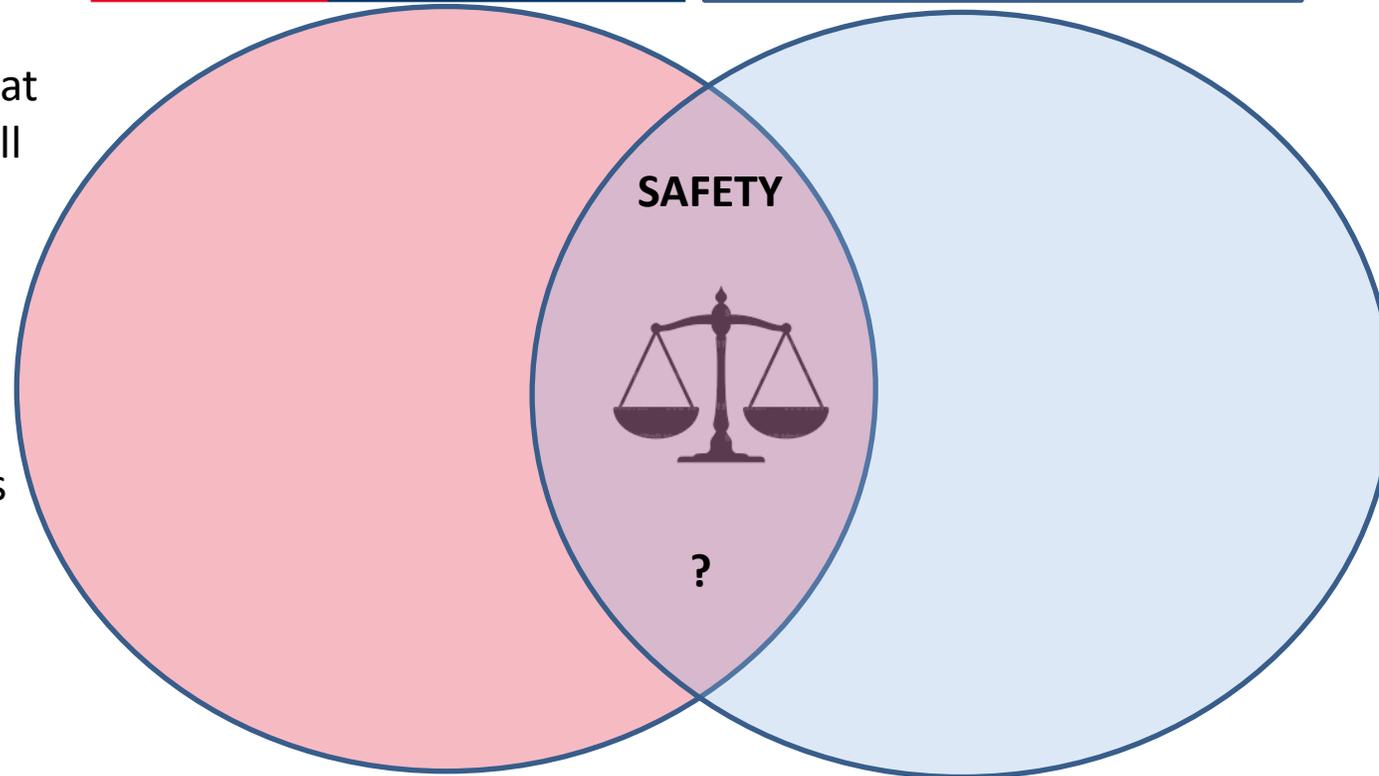
**Great British  
Railways**  
TRANSITION TEAM

Railway Undertakings

[The license] will be redesigned...to reflect that Great British Railways will have **integrated responsibilities across track and train.**

“an **integrated rail body** (Great British Railway) as a new body **responsible for the mainline railway** in Great Britain.

These responsibilities include a **joined up process for business planning.**”



“We are **not proposing any immediate changes to safety** and standards roles across the sector, ...through this consultation **or changes to legislation.**”

the responsibility for the safe operation of the...rail system and the control of risks associated with it is laid upon the infrastructure managers and railway undertakings, **each for its part of the system...**”

# 1. Clarity of Safety Accountability

“The large size of NR, relative to other industry players, has presented something of a barrier to effective co-operation...NR’s heavily-centralised decision-making, its often complex and rigid processes, .... have all inhibited efficient co-operation.”

“Decision-making should, to the greatest extent possible, be taken by the parties who operate the network, and at the levels within the industry which are closest to the market.”

McNulty Report



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## 2. The Affordability Challenge

Willingness to Pay

Sluggish GDP

Inflation



Joshua Shaw, Public domain, via Wikimedia Commons

Value of Preventing a  
Fatality

Growing public expectations

Competition of  
scarce resources

# 3. Technological Change



# 3. Technological Change



# 4. Complacency

“Great Britain has one of the safest networks in Europe and that must continue. Current safety and security roles will remain in place across the rail network.”

*Great British Railways: The Williams-Shapps Plan for Rail*

“Our railways have one of the best safety records in Europe.”

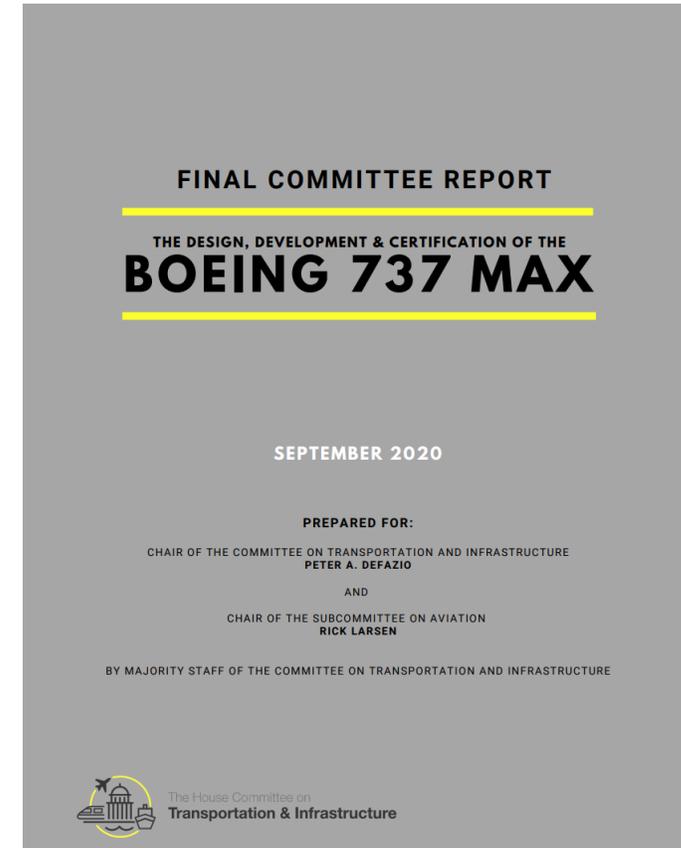
“We are not proposing any immediate changes to safety and standards roles across the sector...A separate consultation will be undertaken with the sector in due course...but this will not impact on our immediate legislative reforms.”

*The Williams-Shapps Plan for Rail: A Consultation on Legislation to Implement Rail Transformation*

# 4. Complacency



*“If it aint Boeing, I aint going.”*



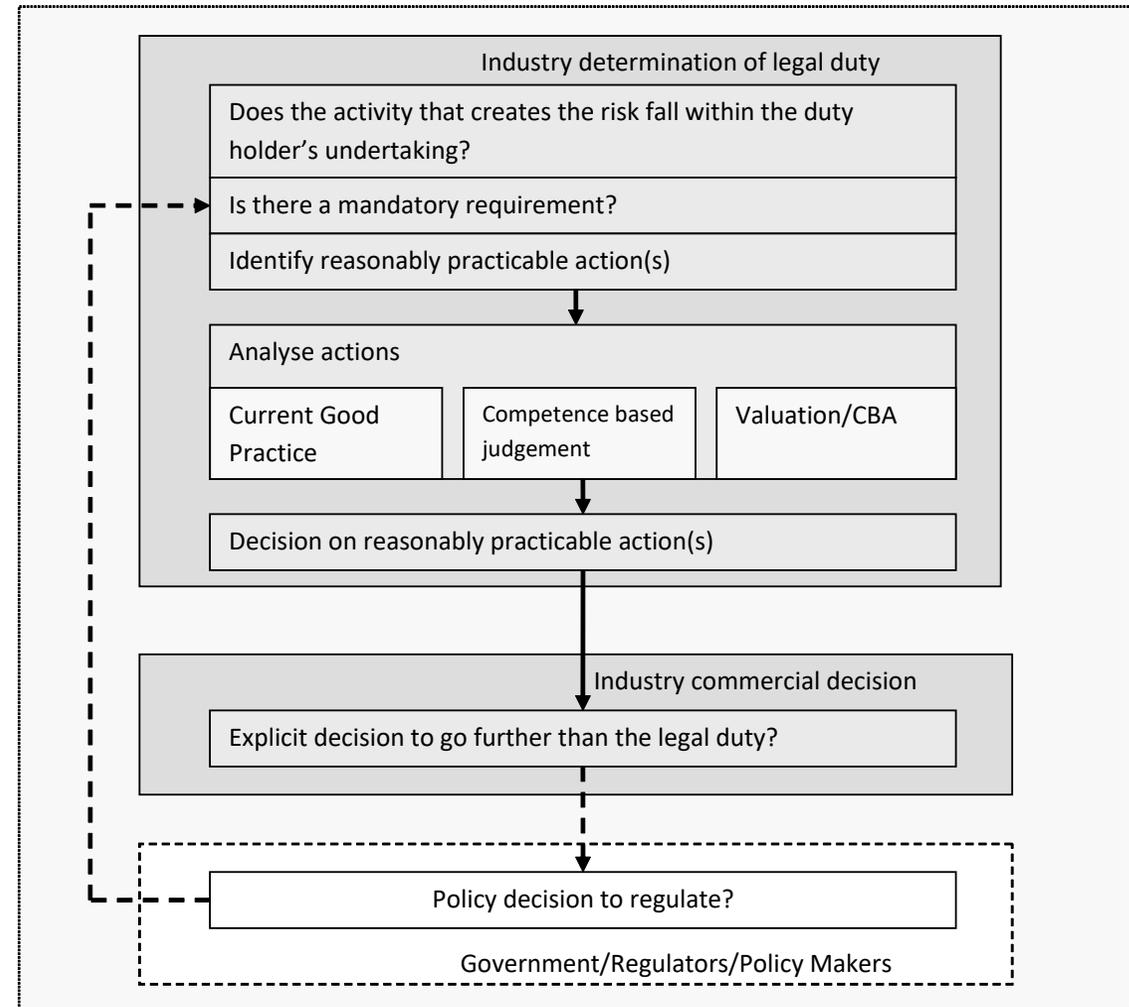
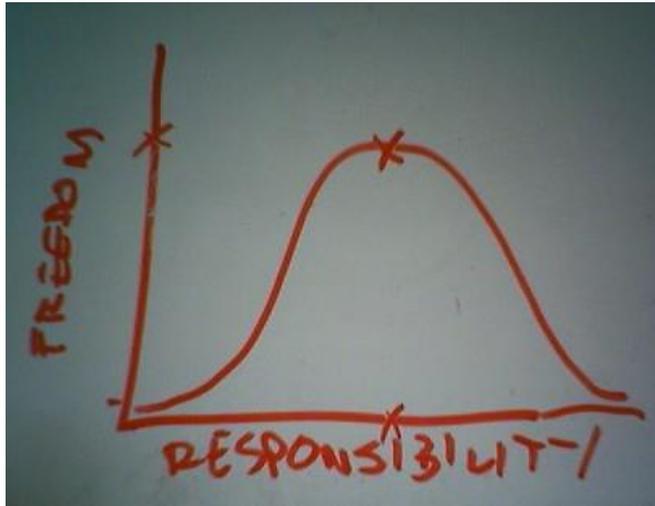
# RECOMMENDATIONS FOR THE WAY AHEAD

# 1. Clarity of Safety Accountability

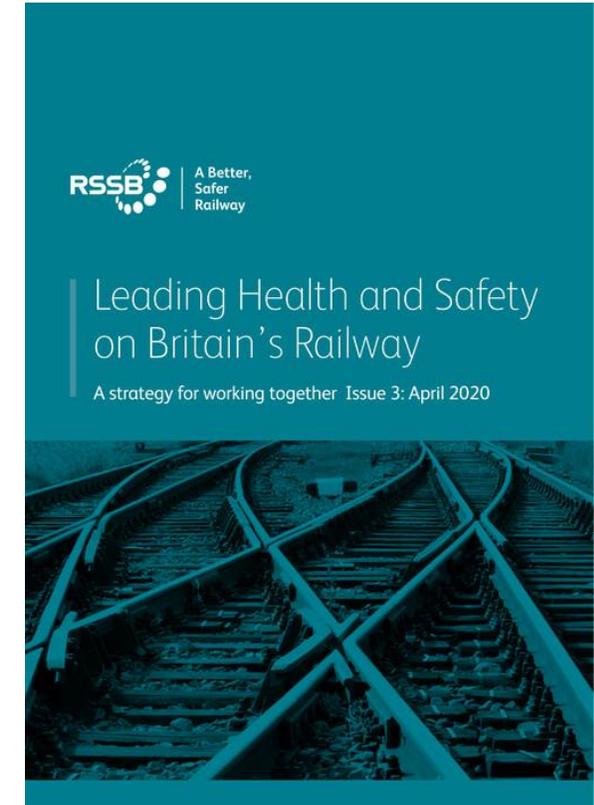
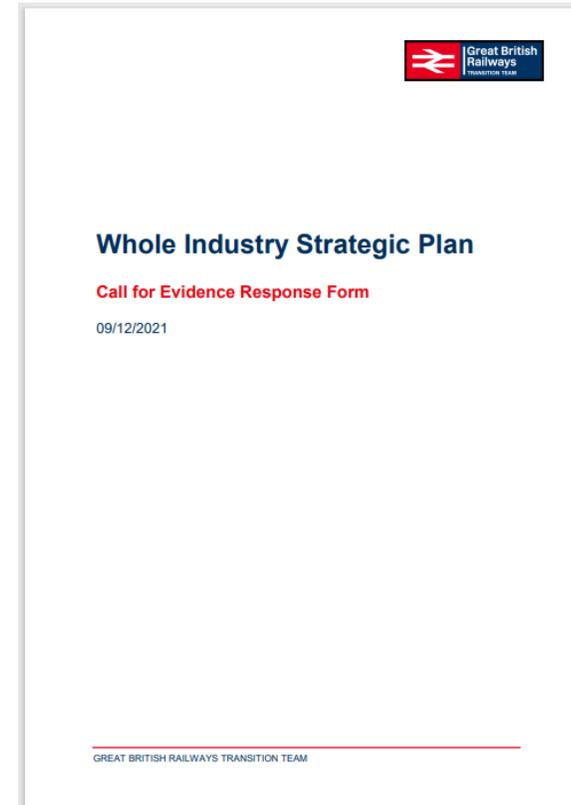
- The industry needs to revisit the baseline organisational structure as it was prior to the introduction of passenger services contracts.
- A risk assessment of changes currently in place and underway needs to be undertaken and a robust organisational structure should be determined.
- This should be done, as if the legal responsibilities (e.g. the Common Safety Method for Risk Assessment, for organisational change) applied at the whole industry level.



# 1. Clarity of Safety Accountability



# 1. Clarity of Safety Accountability



# 1. Clarity of Safety Accountability

- Must be a recognition that despite everyone's best efforts, major accidents are still predicted to occur.
- The industry needs to be designed to be robust enough to absorb the shock of that without becoming inefficient, dysfunctional, or triggering further organisational change and upheaval

## 2. The Affordability Challenge

- Need to revisit the willingness to pay and possibly the VPF.
- Ensure that the rules are fit for purpose.
- Need to ensure that duty holders are able to cost investment to reduce safety risk ALARP – and the funding is provisioned and not part of a broader competition for funds.
- Need to build toolsets comparable to the ALCRM for other stubborn risks, like earthworks.



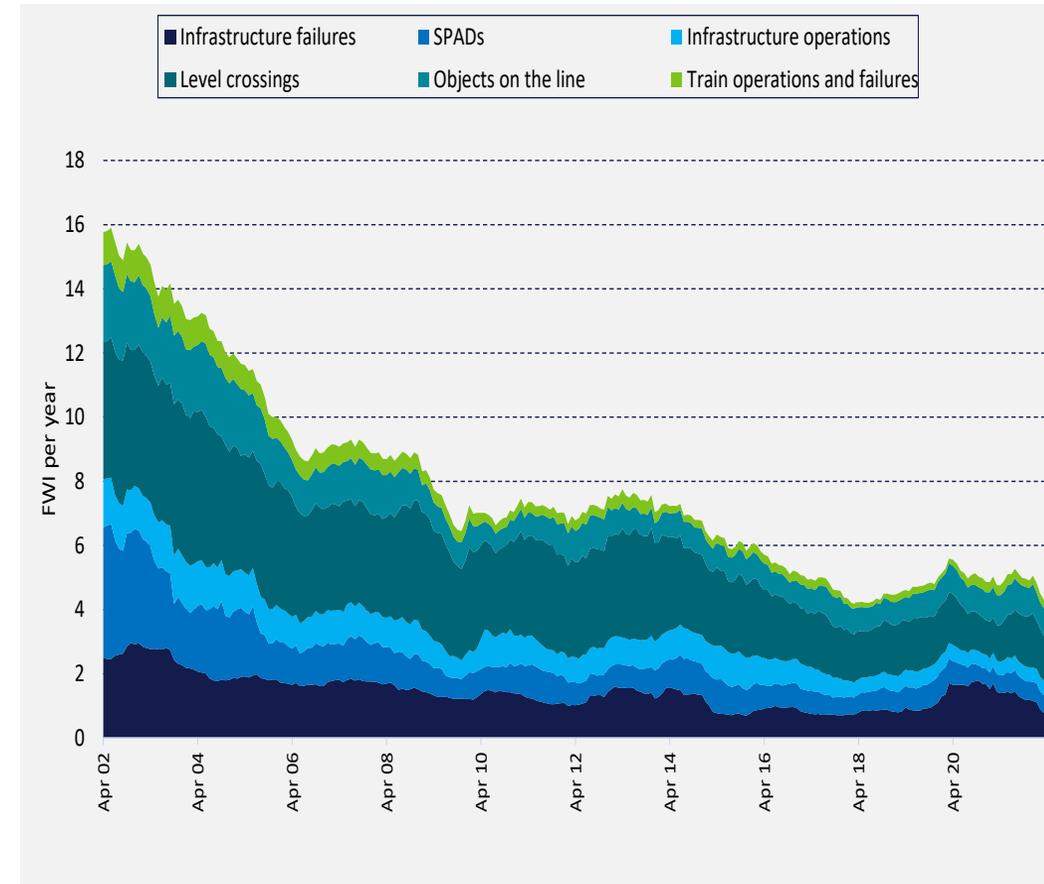
# 3. Technological Change



- Recognition that the railway of the past, on which we've built our safety record is ceasing to exist.
- There are new risks to manage requiring new strategies.
- The industry needs to build new organisational clarity, competences and processes to manage these risks, particularly when contracting for turnkey solutions.

# 4. Complacency

- Need to review messaging
- Need to maintain appropriate focus on major accident risk



# SUMMARY

- GB Rail's strength has been its risk based approach to safety, the rigour and clarity of accountability in its legal framework and its safety culture and leadership. We have excelled in our safety performance in a period of growth.
- GB Rail cannot be complacent and allow the organisational principles on which it built its safety record be undermined by accidental change.



- In fact, its going to need to be better to safely cope with the transformation and cost challenges ahead.
- Major rail accidents have huge and debilitating effects and the risk has not gone away. The industry needs to be built to cope with them if they occur.
- Some strategic recommendations that should be considered in the transition to Great British Railways are set out here.

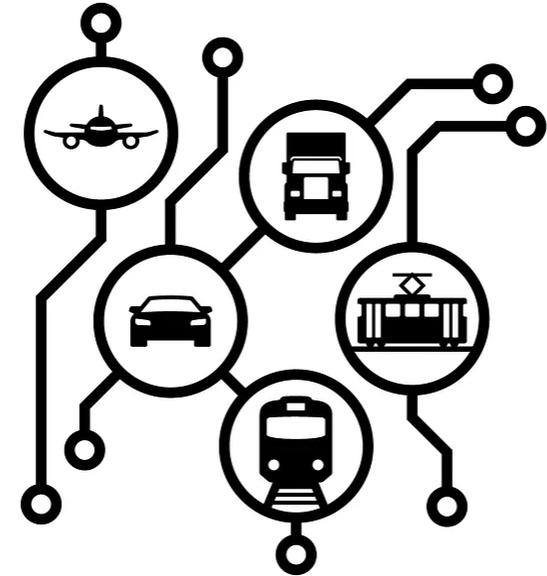


# Many Thanks

A supporting paper, going into these topics in more detail, is in the final stages of preparation.

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<https://techsafetransport.substack.com/>





**SaRS** SAFETY  
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SOCIETY

**arc**

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# Q&A

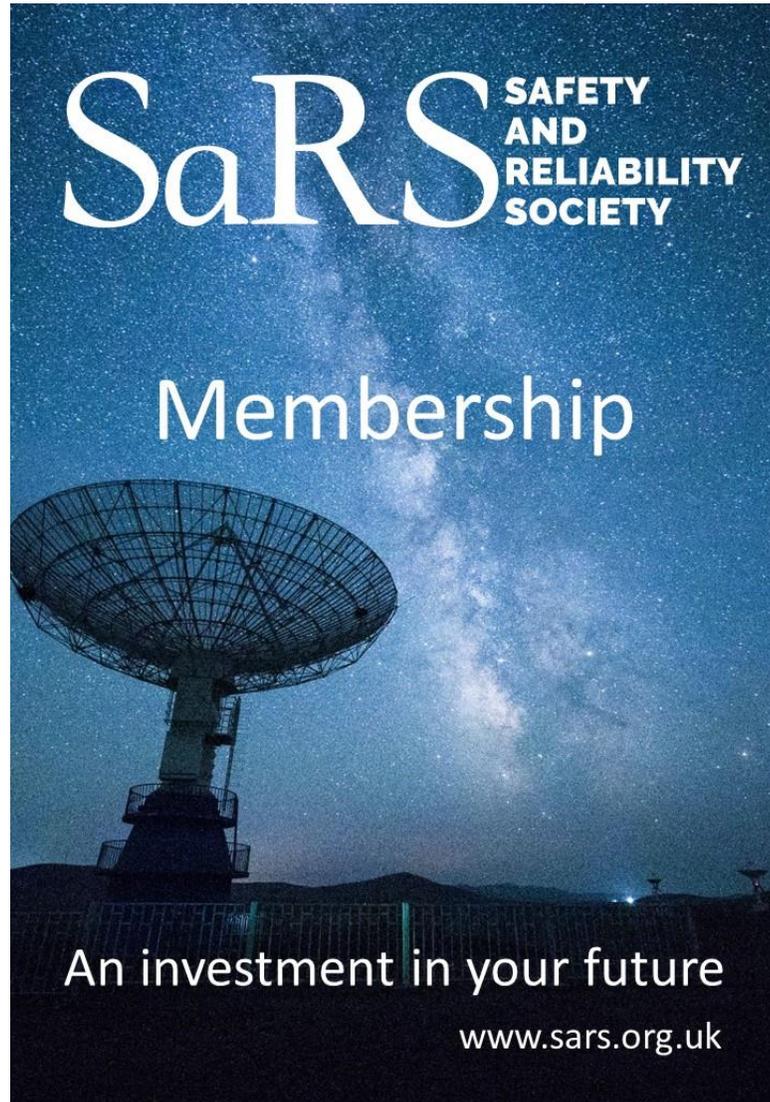
# What is the Safety & Reliability Society?

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- The Safety and Reliability Society (SaRS) was formed in 1980
- **SaRS is a Licensed Member of the Engineering Council for CEng and IEng Professional Registration**
- SaRS has links with many organisations including European Safety and Reliability Association (ESRA) and British Standards Institute (BSI)
- SaRS is run by volunteers who know and understand Safety and Reliability
- It promotes Safety and Reliability learning, development and recognition across all industries in the UK and Internationally



# JOINING SARS



If you are not yet a member please take a look at our new membership brochure on the website.

We accept membership applications from candidates from all relevant backgrounds – membership is open to everyone from students to experienced professionals

More information available at [www.sars.org.uk](http://www.sars.org.uk)

# Accessing the webinar recordings

- All webinar recordings are archived under the Resources Tab on the SaRS website
- SaRS members can access this archive as a member benefit:
  - You can join as a full member, or
  - The simplified **“Associate of the Society”** grade which gives you access to all the SaRS resources including the webinars.
  - See [www.sars.org.uk](http://www.sars.org.uk)
- This webinar recording will be available in a couple of days so keep an eye out if you want to see it again

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