INTERNATIONAL RAILWAY SAFETY COUNCIL 2022

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INTERNATIONAL RAILWAY
SAFETY COUNCIL

SEVILLA, OCTOBER 16-21, 2022

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OFFICE OF RAIL AND ROAD

EUROPEAN UNION AGENCY FOR RAILWAYS

AESF AGENCIA ESTATAL DE SEGURIDAD FERROVIARIA

adif

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# MAKING BEST USE OF DATA AND INTELLIGENCE IN DETERMINING REGULATORY ACTIVITIES ON GREAT BRITAIN'S RAILWAYS

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# Rail Safety Directorate (RSD) – what do we do?

We regulate health and safety for the entire mainline rail network in Britain, as well as London Underground, light rail, trams and the heritage sector:

- provide health and safety guidance and conducting research to promote continuous improvement
- publish reports on the rail industry's health and safety performance
- carry out inspections to ensure that the train and freight operating companies and Network Rail manage both passenger and occupational health and safety risks appropriately
- investigate breaches of health and safety regulation on the railways
- take informal and formal enforcement action, including improvement notices and prosecutions

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**ORR Strategic Objective No 1: a Safer Railway**

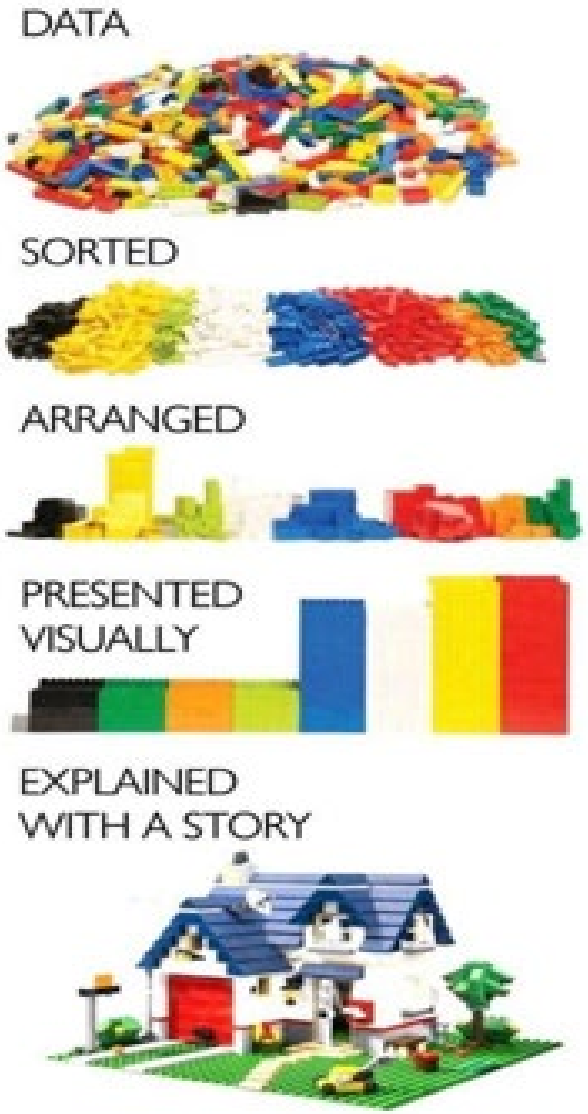
# A Safer Railway

We seek assurances across all the sectors we regulate by confirming that duty holders are controlling risk. We track these risks and overall health and safety performance using data, industry risk modelling, and intelligence from our inspections, audits, and investigations. This gives us a picture of the risk control and management maturity of each duty holder, sector and the rail industry as a whole, and how they are changing over time.

Identifying and prioritising significant risks helps us to focus our resources where we can make the greatest impact on reducing risk. We structure our inspections, audits and activities accordingly.

# Use of data to support decision making on priorities

- RSD has access to lots of data, both internal and external:
  - RSSB data
  - RDG data
  - RIDDOR data
  - Daily logs
  - Inspection reports
  - RM3 End of Year reports
  - Complaints
  - Investigations
- Reality is we did not do much with any data in terms of intelligence and/or analysis



# Risk Assessment and Risk Ranking Process

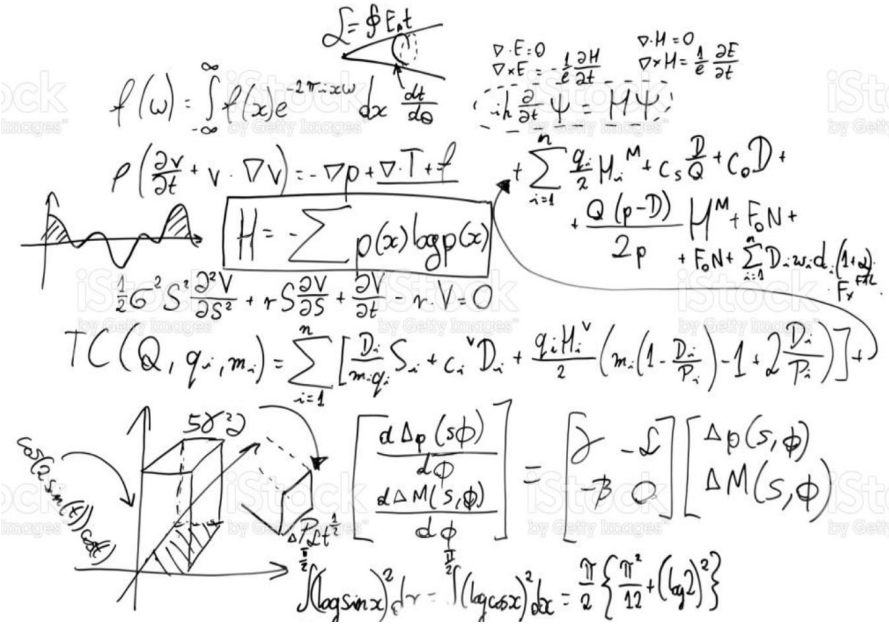
F19

Poor boundary security measures (trespass / animals on line) or failure to maintain/implement suitable boundary measures leading to opportunity for objects on the line/animals and resulting in train derailment.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| catastrophic or multiple consequence are certainly going to raise internal e top 20% of risks should be considered and our reasoning for the level of | | Likelihood | 5 - Certain | Consequence | 5 - Fatality | | **Control Vulnerability considerations:**<br>Is there a control?<br>How effective is the control?<br>How well is the control implemented?<br>Where does the control sit in the hierarchy of controls?<br>5 - Always fails/Not Controlled<br>4 - Frequent Failures<br>3 - Inconsistent control management<br>2 - Some poor performance (minor)<br>1 - Highly Confident<br><br>Source<br>RA Score (High score = worse control vulnerability | | | ORR (RSD) ability to influence factor:<br>5 - Absolute<br>4 - SFAIRP<br>3: ORR can readily add value to reduce the risk<br>2 - ORR intervention difficult<br>1: ORR intervention would not contribute much<br>0 - None<br><br>How much impact would HMRI frontline activity have on influencing this risk? (consider wider ORR interventions, i.e. policy work).<br><br>Risks are filtered/prioritised by Column Q. | | **Public / External Pressure:**<br>5: Hot topic (media interest)<br>4: External interest (PQs, Union)<br>3: Frequently raised (6-monthly)<br>2: Raised in last 1-2 years<br>1: Rarely raised (2 - 5 years)<br>0: Never raised<br><br>What are the external pressures on HMRI to intervene. (Not necessarily related to actual level of risk). This column will allow us to articulate decisions on not intervening on low risk areas). P.S. this column is not taken into account for risk prioritisation. | | |
| | | | 4 - Likely | | 4 - Major (life-changing) | | | | | | | | | |
| | | | 3 - Possible | | 3 - Lost time (trauma) | | | | | | | | | |
| | | | 2 - Unlikely | | 2 - Minor | | | | | | | | | |
| | | | 1 - Remote | | 1 - Trivial | | | | | | | | | |
| oped along side this Risk Assessment and Risk Ranking approach | | Use accident data where available (PHRTAs, RIDDOR, PIM etc)<br><br>Apply professional judgement from cross ref ROGs & RM3 results | | | | | | | | | | | | |
| **Use a Quasi Delphi approach to allocating values**<br>**State: hazard, risk & mechanics of harm** | | Initial Risk Assessment<br>Assessed against the existing control arrangements<br>(Credible Worst Case Scenario) | | **Initial RA Score** | | Consequence<br>Catastrophic<br>Multiple<br>Individual | 5 - No Control<br>1 - Confident | Improvement + Deterioration - in control(s) | **Source RA Score** | 5 - Absolute<br>4 - SFAIRP<br>0 - None | **Source CV Outcome** | Actual Interest | **Source CV Outcome** | **Summary of Comments justifying change i** |
| **Credible worst case risk scenario** | **Mechanism of Harr** | Likelihood | Consequen | Score | Enab | Risk | Control Vulnerabili | Trend (5) 0 (-5) | Control V Outc | ORR ability to influence fac | ORR Influence Outcome | Public / External Pressure | Outcome Incl Public/Extern | |
| Failure in or inadequate SSOW whilst on or near the line leading to workforce being struck by trains | Struck by train | 5 | 5 | 10 | | M | 4 | -1 | 22 | 4 | 17 | 3 | 13 | Public interest 2>3 due to continued interest.<br>Weak supervision and limited track access, recent fatality and histo |
| Poor Patching and modification of software leading to failure in service and resulting in a serious incident. | H&S harm | 5 | 5 | 10 | | C | 4 | -1 | 22 | 4 | 17 | 3 | 13 | Risk drafted in Mainline RARR workshop.<br><br>Based on recent Class 700 software issues. Limited experience and a high priority area. Control vulnerability 3>4 |
| Failure to manage T&V / Suicides leading to unauthorised access to track and lineside resulting in trespasser being struck by train (and/or electrocution) | Struck by train | 5 | 5 | 10 | | I | 4 | -1 | 22 | 4 | 17 | 3 | 13 | Public pressure 4>3. Control vulnerability up, Trend down. Based or |
| Lack of robust SMS/CMS for Charter train operations leading to lack of safe separation and resulting collision between trains. | Collision | 4 | 5 | 9 | | C | 4 | 0 | 16 | 5 | 16 | 2 | 6 | Influence number based on ability to revoke SC from operators. |
| Lack of suitable controls to prevent public coming into contact with live equipment resulting in | Electricity | 5 | 5 | 10 | | I | 4 | 0 | 18 | 4 | 14 | 2 | 7 | Vulnerability and trends reflect mix of legacy and new infrastructure. gradually increasing but not currently reflected in number of instanc control vulnerability reduction from the ESD programme. Increased |

RARR Sheet | Removed Risks | Software Risks | RARR Review Plan | risk matrix

# But there were problems



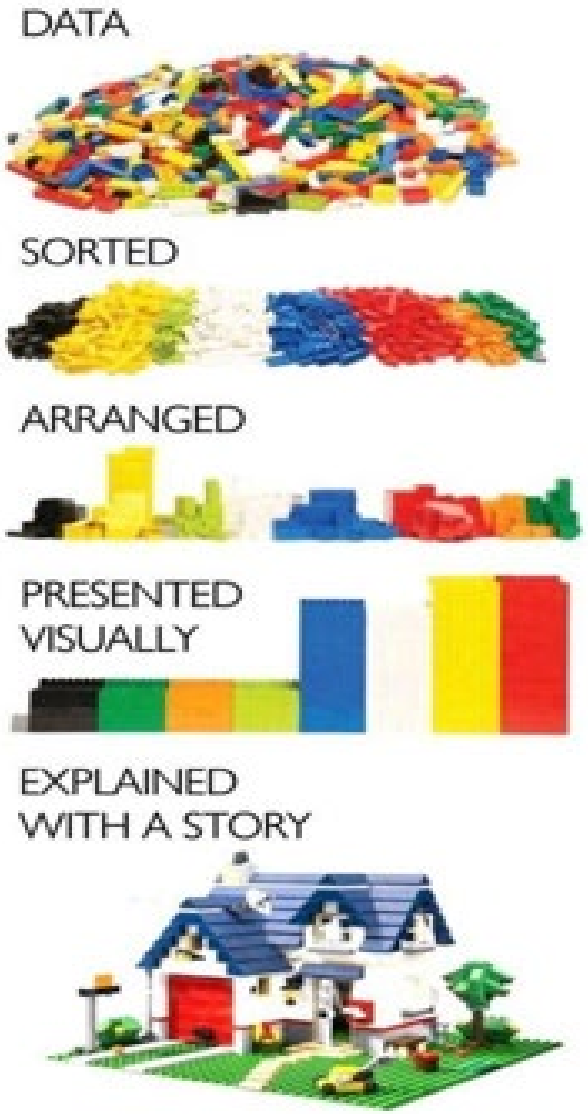
**Did not meet the needs of all users, and without confidence in the data or the process, unsupported professional "judgement" usually won the day**

# End result did not have confidence of anyone involved

- No clear link to any data or evidence source to support priorities
- Changing definitions every year meant could not identify trends
- Over-reliance on professional judgement as sole deciding factor
- We were (sort of) confident we were (probably) looking at the right topics (but could not prove it if questioned)
- We needed a clear audit trail to explain why we prioritized some topics over others

| Risk | Rank | Change |
|---|---|---|
| Failure – slip of cutting/embankment | 1 | ↑ |
| Failure – tunnel, bridge, culvert, station etc | 2 | ↑ |
| Train – striking animal | 3 | ↑↑ |
| Rail – buckle | 4 | ↑ |
| Permanent way – flooding (ballast) | 5 | ↑ |
| SPAD | 6 | ↓ |
| Broken rail (incl fishplates) | 7 | ↑↑ |
| Struck by train in depot (shunting) | 8 | ↑ |
| Track worker safety (struck by train on running line) | 9 | ↓ |
| Electrical safety – workforce | 10 | ↑ |
| Signalling irregularities | 10 | ↑ |
| Bridge strike | 12 | ↑↑ |
| Train – striking other objects (e.g. trees) | 13 | ↑ |

# How did we deal with these multiple challenges?



# If at first you do not succeed…

- **2020** tried to improve existing RARR process and use a particular data set (RIDDOR) to benchmark hazards and risks – **FAILED,** but ***senior leaders were supportive and understanding***

- **2021** started from complete scratch, changed name from RARR to Risk Profiling
  - worked with ORR Analysis Team to identify and better present data to support decision making
  - removed the complicated weightings
  - Used an agreed list of hazard topics (linked to RSSB Safety Risk Model (SRM) categories) to allow us to spot trends longer term
  - after a lot of consultation with stakeholders to reassure them professional judgement remained an important component – **BETTER**

- **2022** went to an outside contractor to build us a properly designed process:
  - Benchmarked against other regulators both in GB and internationally
  - Keep it simple was the mantra
  - Lots of engagement and identified RSD risk champions who sold it to their colleagues

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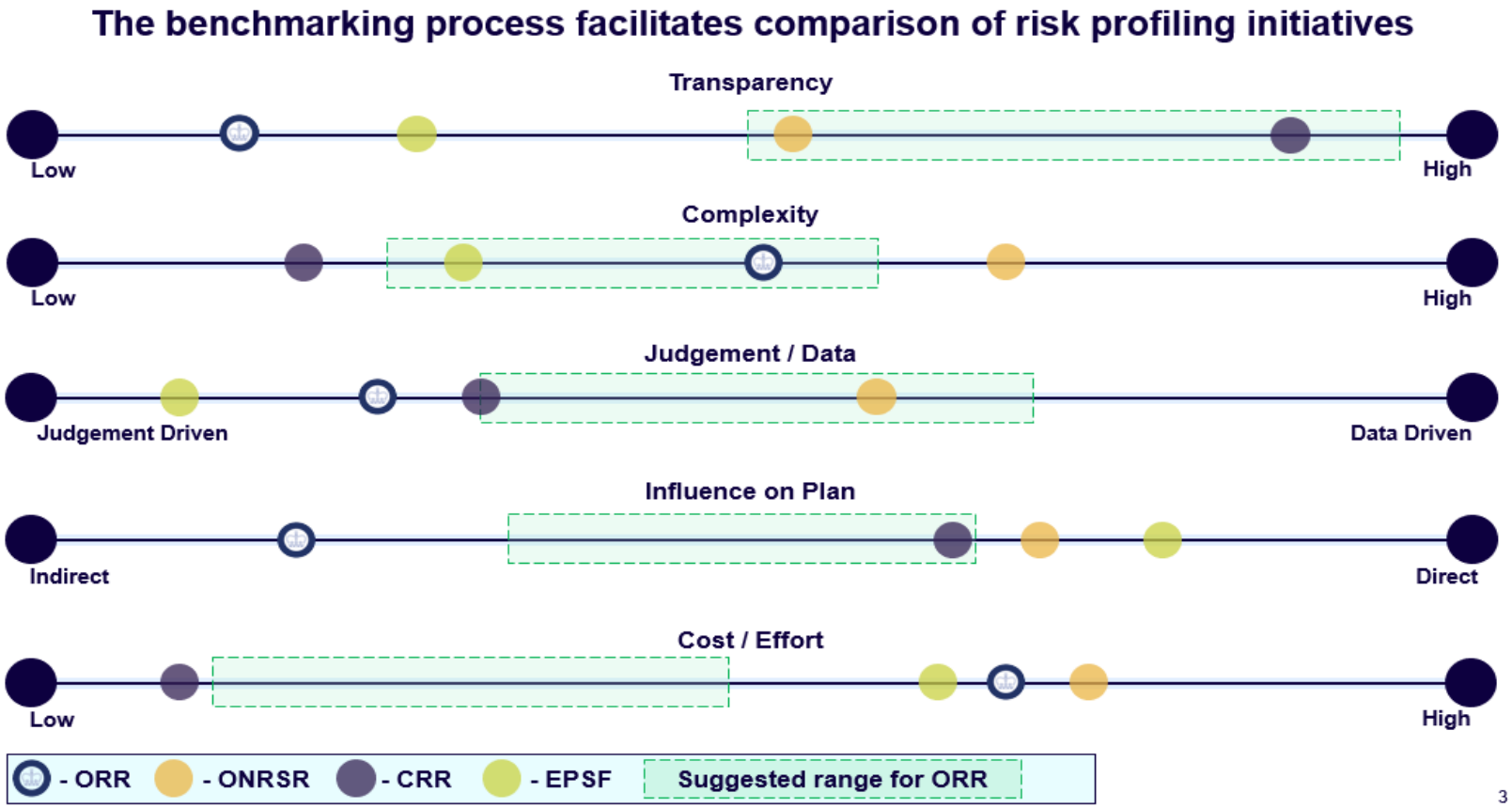
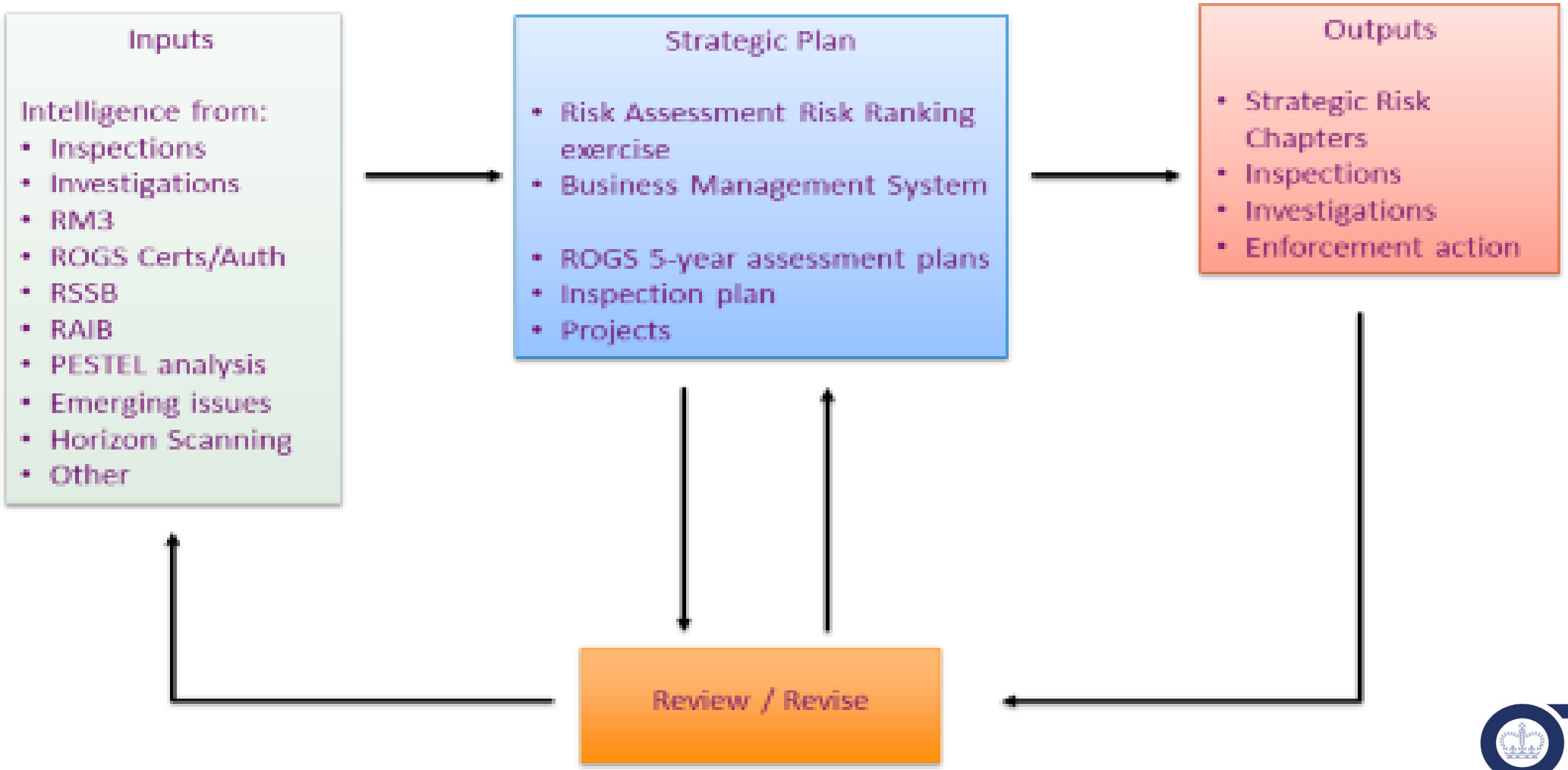
# Now have a “best in class” process for our risk profiling



# Figure 1: Risk Profiling Lifecycle
# Plan – Do - Check - Act

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# Aims and objectives of new risk profiling exercise

**A process that draws from all of the credible sources of information available to us:**

Inspectors' experience

Inspection findings

Safety reports

**A tool that facilitates the methodical assimilation of all the factors above**

**A record of the deliberation and decisions made…**

**…and why**

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**Matrix 1:** Total actual harm/ worst credible harm matrix – this forms the starting point for determining the "inherent threat score"

| Worst Credible Harm | | Total Actual Harm (Annual) | | | | |
|---|---|---|---|---|---|---|
| | | FWI Range | FWI Range | FWI Range | FWI Range | FWI Range |
| | | 0 | 0 – 0.1 | 0.1 - 1 | 1 - 10 | 10 + |
| Catastrophic | Fatality or multiple fatalities expected | 2 | 3 | 4 | 5 | 5 |
| Major | Severe injury or disability likely; some potential for fatality | 2 | 3 | 4 | 5 | 5 |
| Moderate | Lost time or injury likely; potential for serious injury; small risk of fatality | 2 | 3 | 3 | 4 | 4 |
| Minor | First aid required or small risk of serious injury | 1 | 2 | 3 | 3 | 3 |
| Negligible | No injury or health effect | 1 | 1 | 2 | 2 | 2 |

**Matrix 2:** Total industry performance trend/ industry exposure matrix – this forms the starting point for determining the "industry capability score"

| Industry Exposure | | Industry Performance Trend | | | | |
|---|---|---|---|---|---|---|
| | | Improving | | Static | Worsening | |
| | | 10%+ | 0% - 10% | 0% | 0% - 10% | 10%+ |
| Catastrophic | Fatality or multiple fatalities expected | 2 | 3 | 4 | 5 | 5 |
| Major | Severe injury or disability likely; some potential for fatality | 2 | 2 | 3 | 4 | 5 |
| Moderate | Lost time or injury likely; potential for serious injury; small risk of fatality | 1 | 1 | 1 | 3 | 4 |
| Minor | First aid required or small risk of serious injury | 1 | 1 | 1 | 2 | 3 |
| Negligible | No injury or health effect | 1 | 1 | 1 | 2 | 2 |

| | Hazard: | Track integrity lost (Infrastructure Asset Integrity) | | | |
|---|---|---|---|---|---|
| | Guide question | Score | Data | Judgement | Commentary |
| Inherent threat | Use Matrix 1 to determine threat level based on data. | 5 | Yes | Yes | Specialist Team Report, SHEP data, Chief Engineers Report |
| | Is there a recent negative trend in total actual harm? | 0 | Yes | Yes | Specialist Team Report, SHEP data, Chief Engineers Report |
| Industry Capability | Use Matrix 2 to determine how the main duty holder manages with respect to this risk? | 4 | Yes | Yes | Medium as problems with delivering train borne inspection |
| | Are there any concerns about how easily the industry can influence control of this hazard? | 1 | Yes | Yes | Impact of climate on track geometry, imminent modernising maintenance changes, industrial relations issues, concerns around key staff competence, track recording runs |
| | Are there any concerns about the capability/maturity of the main duty holders leadership with respect to this hazard? (informed by RM3) | 0 | No | Yes | Chief engineers report, safety management systems not being implemented - competence management and modernising maitenence |
| | Are there any concerns about the effectiveness of the main duty holder SM systems with respect to this hazard? (informed by RM3) | 1 | Yes | Yes | Chief Engineers Report - modernising maintenance and competence management |
| External Pressure (Stakeholder interest) | Is there a high expectation from society for this hazard to be managed? | 1 | No | Yes | |
| | Is there a particular government interest in managing this hazard robustly? | 1 | No | Yes | |
| | Is there particular union or workforce interest in managing this hazard robustly? | 1 | No | Yes | |
| | Is there particular industry interest in managing this hazard robustly? | 1 | No | Yes | |
| Internal Pressure | Are there any concerns about ORR's recent history of regulating this threat/hazard? | 0 | No | Yes | |
| | Are there any concerns with RSD's particular ability to influence change in this area effectively? | 1 | No | Yes | Impending staff changes may affect our capability |
| | Are there any concerns about ORR's particular ability to influence change in this area effectively? | 1 | No | Yes | See above |
| | Are there any concerns about ORR's understanding of the hazard and its effects/mitigations? | 0 | No | Yes | |
| | Does ORR lack an enforceable legal duty in this area? | 0 | No | Yes | |

ILLUSTRATIVE

Potential breakdowns:
- By sector
- By public, passengers and workforce

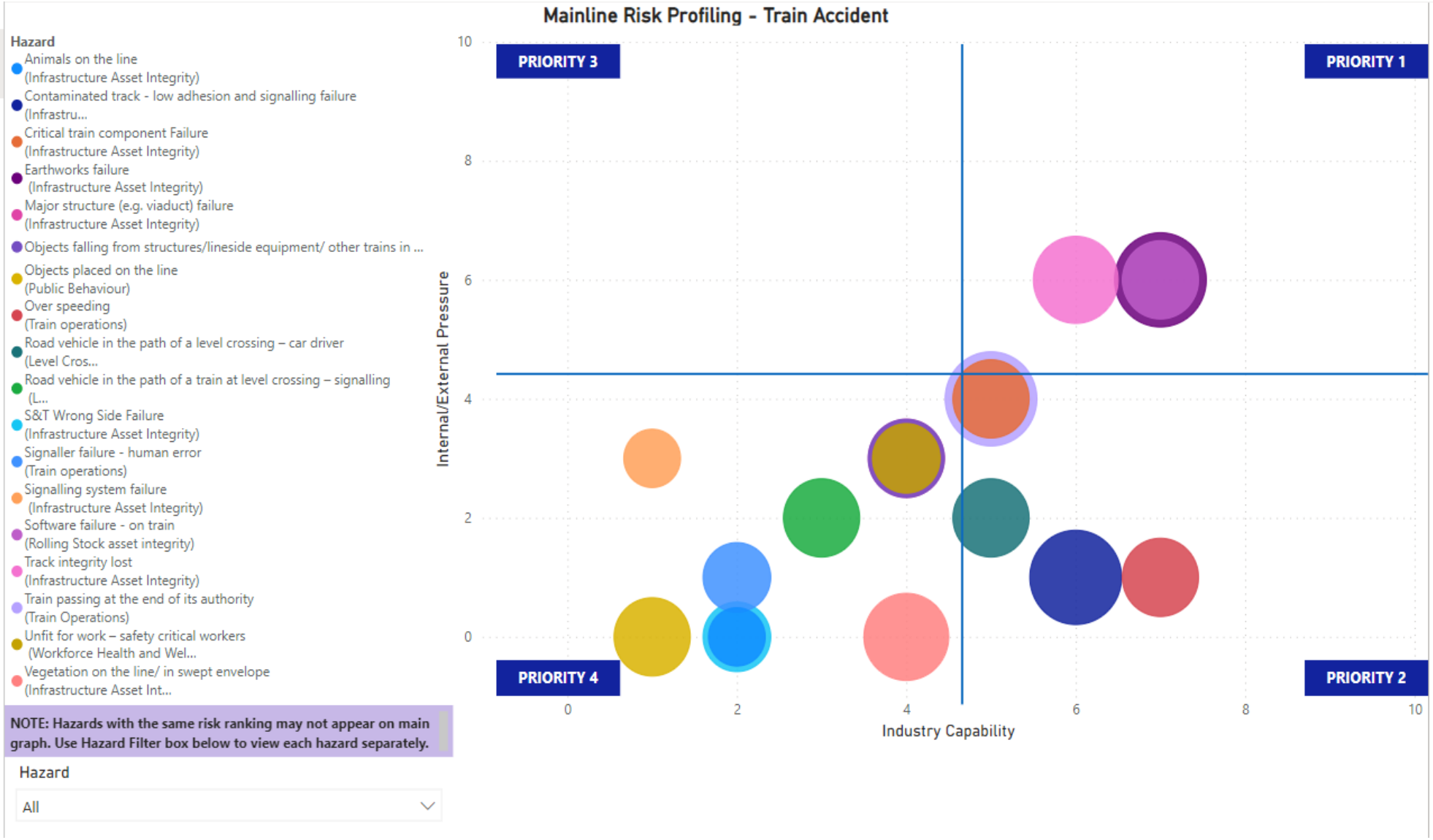
Pay particular attention to priority 3 risks – some still have a potentially high inherent threat and they are often overlooked. Should be reviewed at least once a year (we do not want 'neglected risk areas')

- The aim is to provide an overall risk map of key hazards
- The map is dynamic & changes based on the results of risk profiling activity
- Three parameters:
  - Industry capability
  - Internal and external factors
  - Inherent Threat
- Items at the top right will be priority areas for attention
- There would be concern if hazards with high inherent risk appear in the top half of the Map
- 'Good' is items moving to the bottom left

Train Accident

Workforce

Passenger and Public




NOTE: Hazards with the same risk ranking may not appear on main graph. Use Hazard Filter box below to view each hazard separately.

Hazard

All

# Benefits of the new risk profiling exercise

- Will ensure we have a transparent, accountable and targeted decision-making process
  - Can show what evidence is used to support decisions
- Has the confidence of the users and was not “imposed” top-down on them but instead developed in consultation with them
- It is ok to get it wrong, to take a risk – provided you learn the lessons!
- Sometimes keeping it simple is the way forward
  - Reduced the number of hazard topics from several hundred to about 40
- Now have a properly designed, best in class risk profiling process, which can be adapted to focus on needs of the different sectors: Mainline, Heritage, Transport for London, Trams and Light Rail

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