ORR / HRA RM3 2019 Seminars

ORR protects the interests of rail and road users, improving the safety, value and performance of railways and roads today and in the future

Safety Management Systems

Why?

Ian Skinner

Assistant Chief Inspector of Railways
Office of Rail and Road

ORR's vision for GB's Railways

Zero workforce and industry-caused passenger fatalities, with an ever decreasing overall safety risk

- *My perception* on passenger's expectations:
  - '*1953 experience' with 21st century levels of safety and service*

- A management system will help achieve this.
  - Stop and think
  - Improve
  - Record

Purpose of a management system

- What is the number one objective of a heritage railway organisation?
  - Preserve & enjoy – members and visitors
  - Helping visitors understand rail based history
  - More track, locos, carriages?
  - Make money?

Delivery of something that 'the market' needs

- Management system help deliver a solution to the identified market need.
- Good management systems do that:
  - Repeatedly;
  - Efficiently;
  - Responsively; and

!!!SAFELY!!!

Why do ‘heritage’ need management systems?

Low speed ≠ little risk

Think of the energy:

- moving vehicles – kinetic energy
- gravity – potential energy
- steam boiler, braking systems – stored energy

Think of the controls:

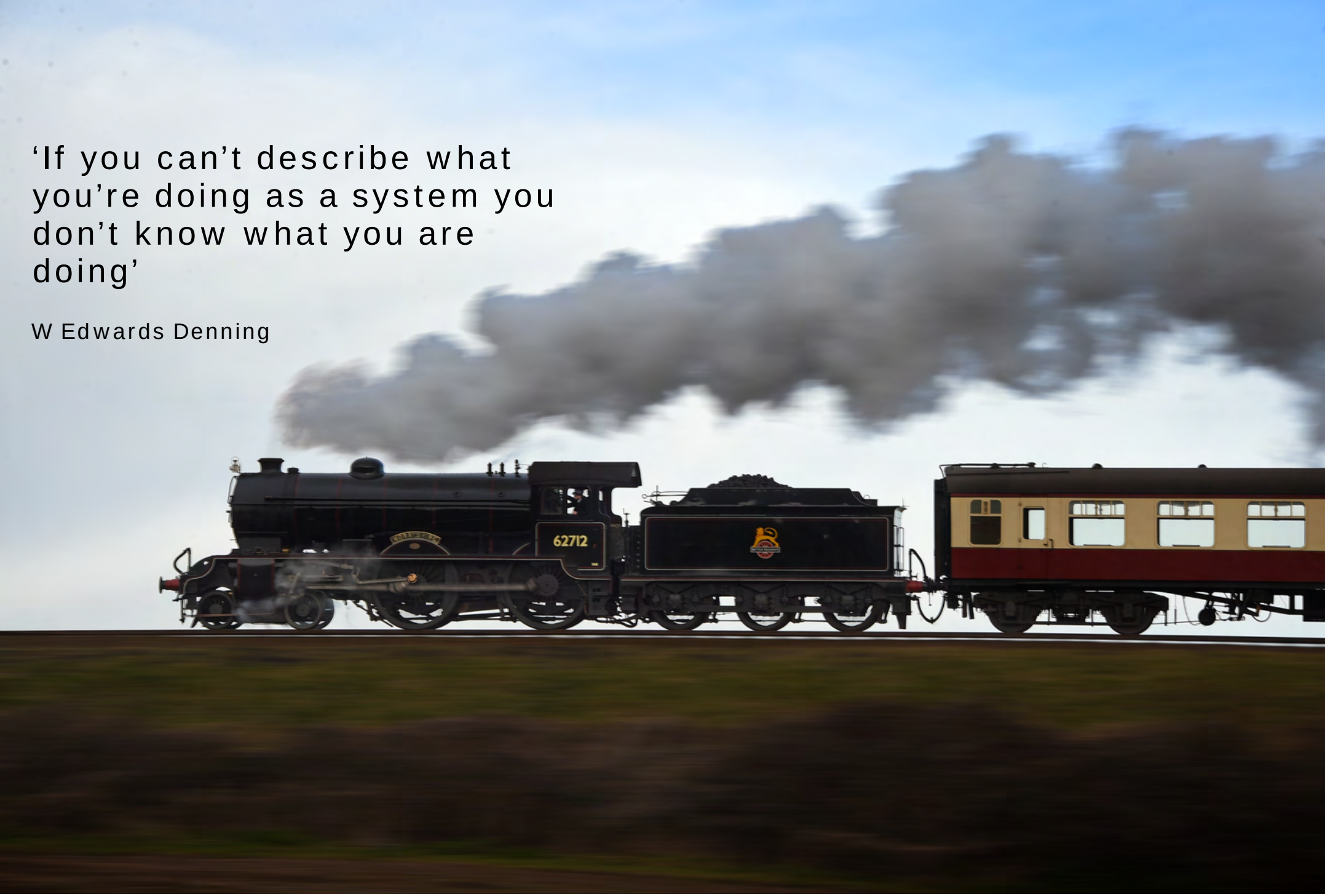
- the hardware
- role of the paid workers & unpaid volunteers
- and passengers

The Management System Principles

- Know your operation / asset
- Know your risks
- Know your controls
  - *And gaps*
- Put in place:
  - Planning
  - Organisation
  - Monitoring
  - Review
- And demonstrate it

‘If you can’t describe what you’re doing as a system you don’t know what you are doing’

W Edwards Denning



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OFFICE OF RAIL AND ROAD

An introduction to RM^3

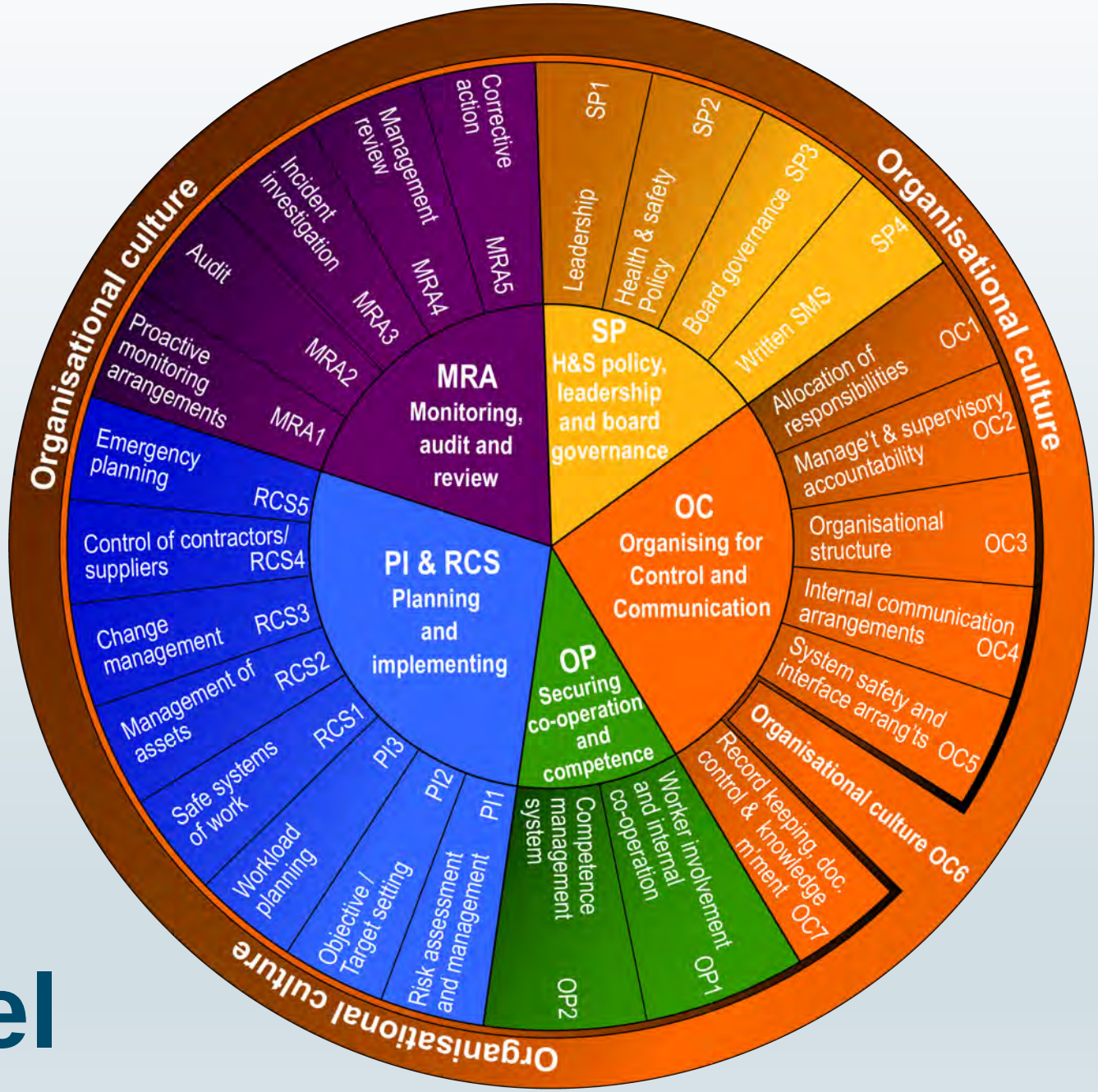
and the five maturity levels

Ian Skinner

Assistant Chief Inspector of Railways
Office of Rail and Road

RM³ Risk Management Maturity Model

The RM³ model



The 5 maturity levels

Proactive/continual improvement

Delivery can be predicted by the management system
Variation and change is controlled

Good practice synthesised into standard processes

Local groups are organised to ensure repeatable performance BUT
each work group performs similar tasks differently

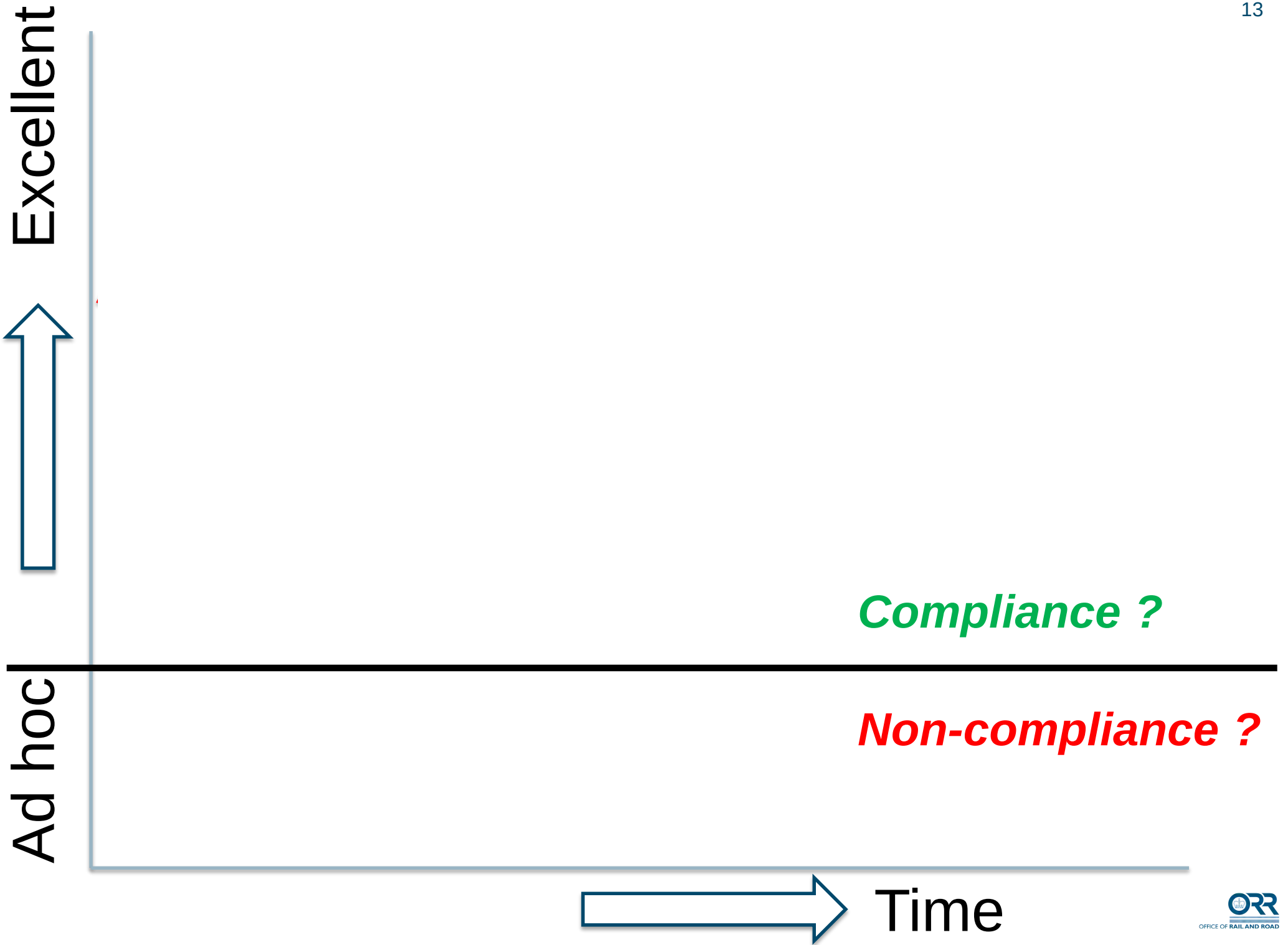
Ad hoc and uncoordinated

Why does risk control need to get better?

…because essentially it is people that control risks day in, day out and human performance varies.

If they are already high performing ("excellent"), then greater likelihood that any dips in performance will still be above the legal minimum and risks will be adequately controlled…

…If they are only poorly performing ("ad hoc"), then greater likelihood that their normal performance (and any dips) are below the legal minimum and risks are uncontrolled.


Excellent
Ad hoc
Compliance ?
Non-compliance ?
Time

Getting better in risk control .....the legal bit

The Railways and Other Guided Transport Systems (Safety) Regulations 2006

schedule 1 looks for the safety management system to show how continuous improvement of the safety management system is ensured.

and, more generally

The Management of Health and Safety at Work Regulations 1999

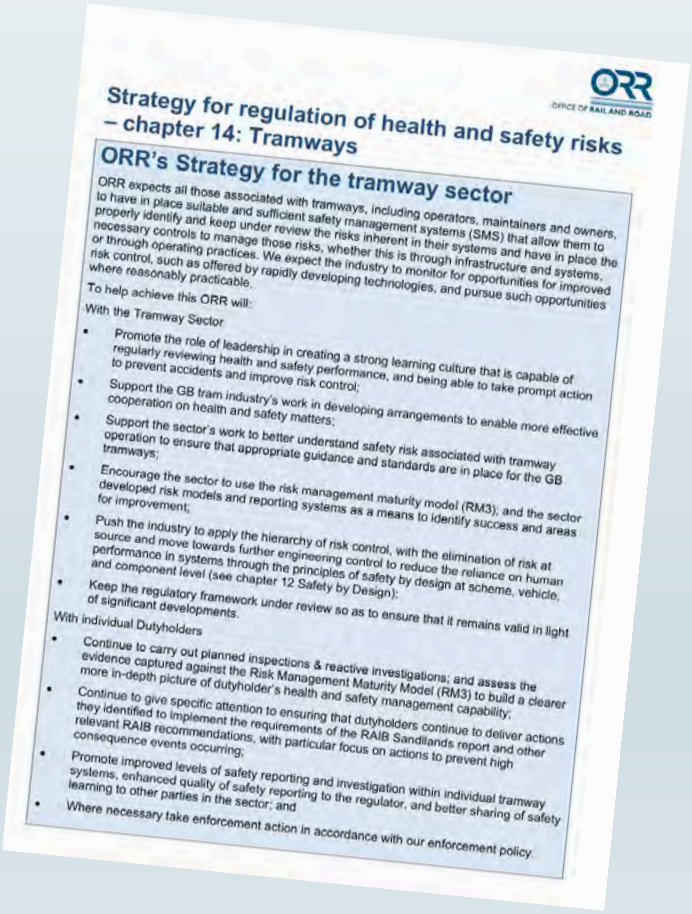
looks for continuous improvement through risk assessment and control through the principles of prevention (the ‘risk control hierarchy’) and the requirement to review arrangements.

So what about the risks?...
… what is ORR's focus?

- *Health and safety management systems*
- *Industry staff competence and human failure*
- *Management of change*
- *Level crossings*
- *Interface system safety*
- *Track*
- *Civil engineering assets*
- *Rolling stock asset management*
- *Occupational Health*
- *Worker safety*
- *Management of train movements and signalling*
- *Health and safety by design*
- *Leadership and culture*
- *Tramways*

Our strategy for regulating risks …

… is set out in our 14 Strategic Risk Chapters



ORR
OFFICE OF RAIL AND ROAD

Strategy for regulation of health and safety risks – chapter 14: Tramways

ORR's Strategy for the tramway sector

ORR expects all those associated with tramways, including operators, maintainers and owners, to have in place suitable and sufficient safety management systems (SMS) that allow them to properly identify and keep under review the risks inherent in their systems and have in place the necessary controls to manage those risks, whether this is through infrastructure and systems, or through operating practices. We expect the industry to monitor for opportunities for improved risk control, such as offered by rapidly developing technologies, and pursue such opportunities where reasonably practicable.

To help achieve this ORR will:

With the Tramway Sector

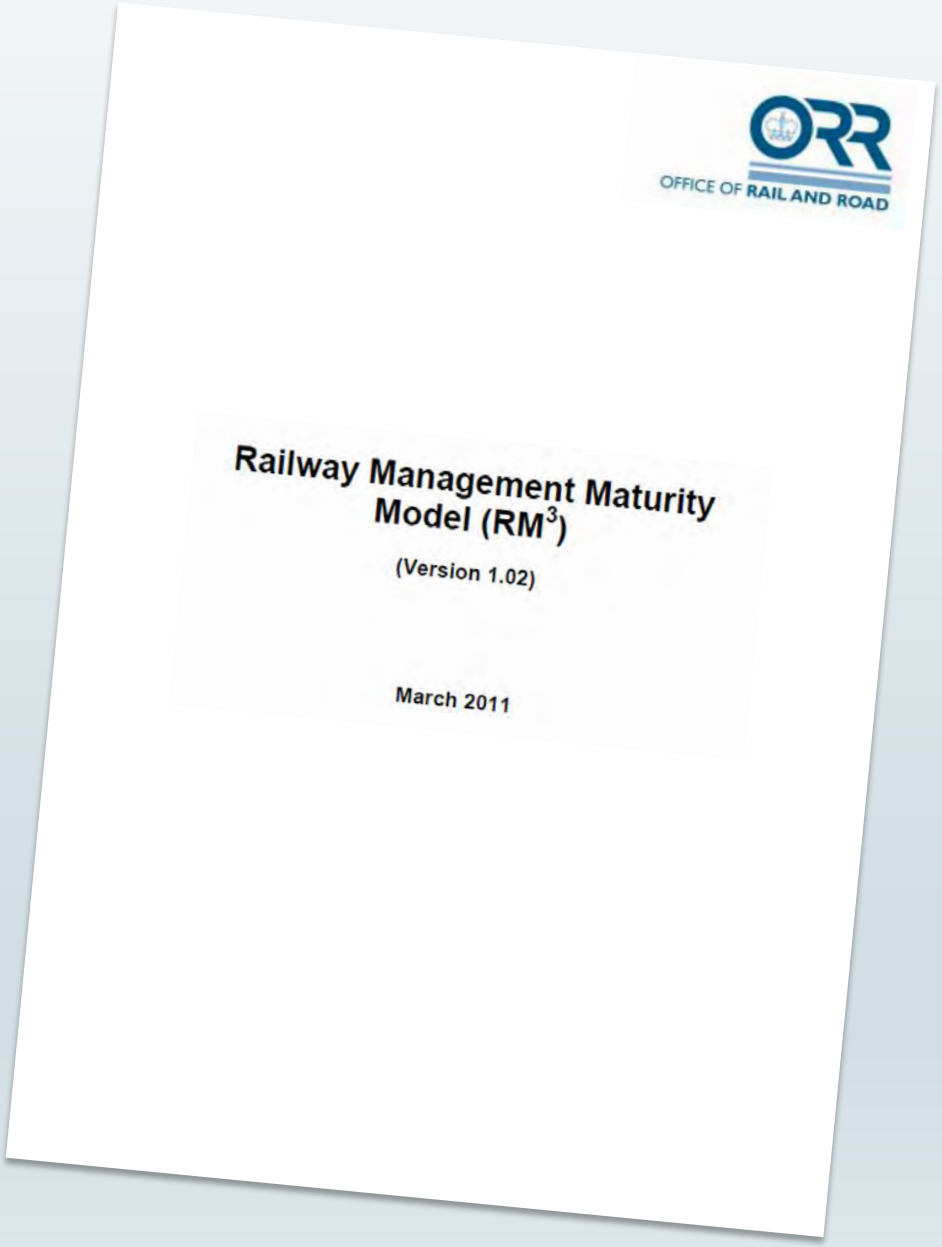
- Promote the role of leadership in creating a strong learning culture that is capable of regularly reviewing health and safety performance, and being able to take prompt action to prevent accidents and improve risk control;
- Support the GB tram industry's work in developing arrangements to enable more effective cooperation on health and safety matters;
- Support the sector's work to better understand safety risk associated with tramway operation to ensure that appropriate guidance and standards are in place for the GB tramways;
- Encourage the sector to use the risk management maturity model (RM3); and the sector developed risk models and reporting systems as a means to identify success and areas for improvement;
- Push the industry to apply the hierarchy of risk control, with the elimination of risk at source and move towards further engineering control to reduce the reliance on human performance in systems through the principles of safety by design at scheme, vehicle, and component level (see chapter 12 Safety by Design);
- Keep the regulatory framework under review so as to ensure that it remains valid in light of significant developments.

With individual Dutyholders

- Continue to carry out planned inspections & reactive investigations; and assess the evidence captured against the Risk Management Maturity Model (RM3) to build a clearer more in-depth picture of dutyholder's health and safety management capability;
- Continue to give specific attention to ensuring that dutyholders continue to deliver actions they identified to implement the requirements of the RAIB Sandilands report and other relevant RAIB recommendations, with particular focus on actions to prevent high consequence events occurring;
- Promote improved levels of safety reporting and investigation within individual tramway systems, enhanced quality of safety reporting to the regulator, and better sharing of safety learning to other parties in the sector; and
- Where necessary take enforcement action in accordance with our enforcement policy.

The RM^3 journey

2011

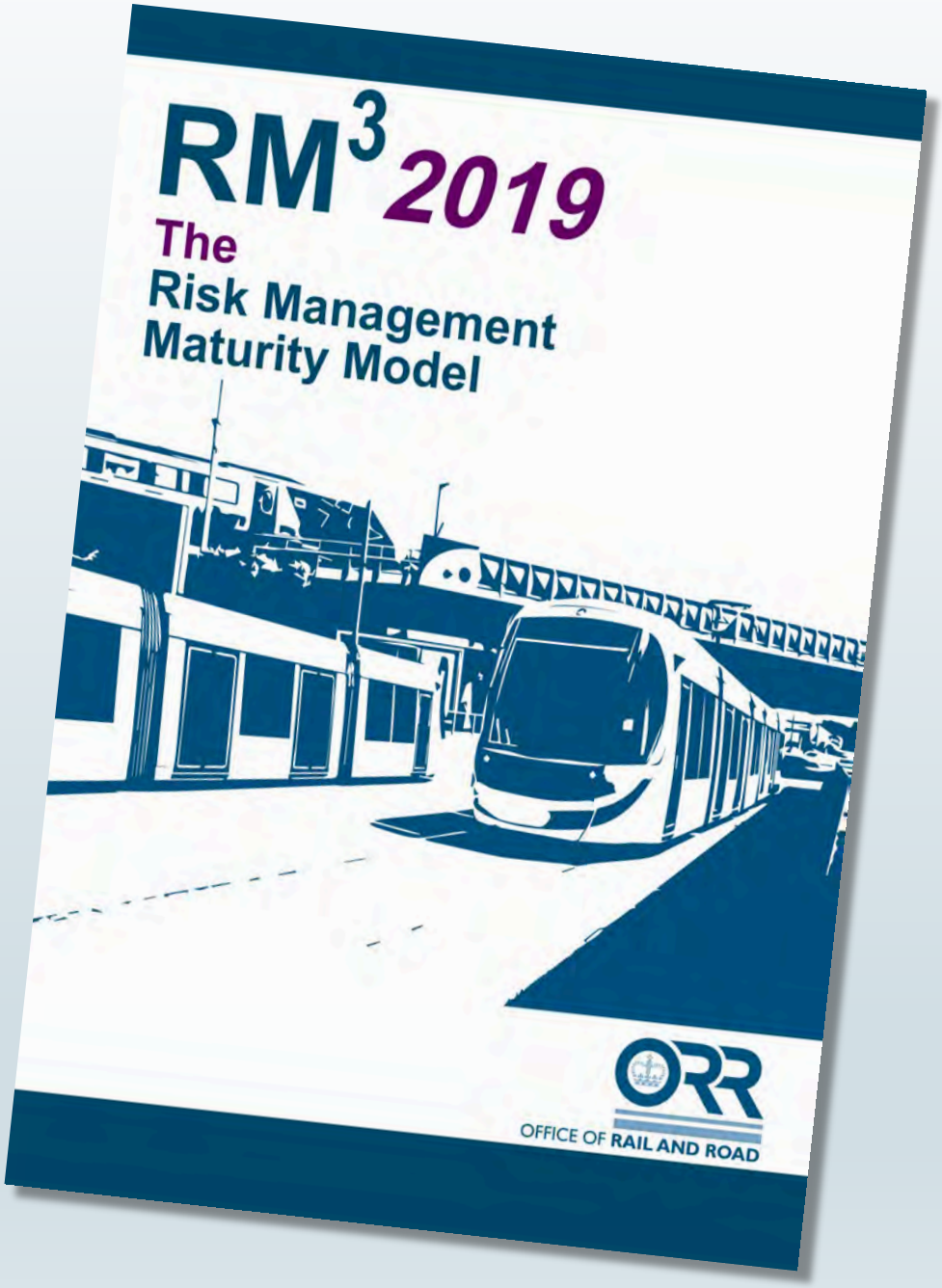


RM3
The Risk Management
Maturity Model
OFFICE OF RAIL AND ROAD

2017

2019

- *Version 3 published on 1st April*



SP 1 Leadership

SP 1

Leadership from the top provides a consistent example and inspiration for leaders at all levels of the organisation. Good leadership in health and safety (H&S) management involves:

- The attitudes and decisions of senior managers aligning with the H&S policy and culture;
- Identifying and promoting the styles of leadership and management practices at all levels, which best support a positive health and safety culture;
- Promoting effective collaboration and engagement of all workers and business partners to achieve continuous improvement on health and safety;
- Aligning the leaders in operational management, organisational functions and operational and support units in pursuit of the common health and safety purpose, strategies and goals;
- Assessing health and safety leadership and management behaviour to motivate and reward success, in improving the control of risk; and
- Adjusting the performance-management and reward systems so they help the organisation achieve its goals and strategies for improving health, safety and performance.

Excellence

- Leaders at all levels of the organisation demonstrate shared values which strive towards continuous improvement.
- Leaders search within and outside the organisation for opportunities to improve risk control in their area of the organisation to ensure it is as effective and efficient as possible.
- Leaders always consider how they influence others, recognising that good leadership is compelling not coercive.
- They pro-actively promote a positive culture and encourage safety improvements in all areas of the business.
- Health and safety leaders recognise that better results are achieved through exercising power with, rather than over, staff.

Culture
Leaders recognise they have an obligation to foster the kind of organisational climate where people find it easy to speak up and share when they have made mistakes rather than covering up errors.

- Leaders encourage people and [illegible] them to join forces and to participate as responsible individuals in a collaborative institutional enterprise.

Non-technical management skills development is recognised as world class

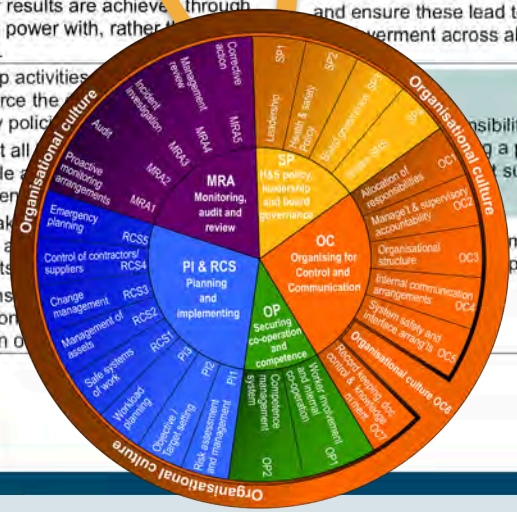
Leadership demonstrates and reinforces the values and culture of the organisation and ensure these lead to engagement and involvement across all layers.

Predictable

- Leadership activities and reinforce the and safety polici
- Leaders at all are credible improvemen
- Leaders tak the health achieves its
- Leaders ins organisation H&S vision o

[illegible]sibility for developing, [illegible]g a positive culture [illegible] supports effective

[illegible]ment skills are [illegible]oped within the



Standardised

- The organisation is built around a command and control structure with some feedback.
- There is a rule book-based approach to health and safety management, this can result in unwavering adherence to standards with little innovation or flexibility.
- Collaboration occurs as specified in 'the rules'.

Culture
Leadership is still largely viewed as a senior management role.

- Non-technical skills are specified and staff receive appropriate training.

Managed

- There may be managers with health and safety leadership skills, but these are not proactively developed by the organisation.
- Managers demonstrate leadership skills but these are not recognised by everyone or used consistently within the organisation.
- The organisation's goals and priorities are not understood by all leaders in the organisation.
- Some collaboration occurs but often by chance rather than planned, and depends on individuals involved rather than being systematic.

Culture
Leadership is viewed solely as a senior management role.

- There is no consistency over how non-technical management skills are developed in the organisation.

Absent

- There is no evidence of positive health and safety leadership at any level in the organisation.
- [illegible] considered to be important in staff development.
- No effective application of health and safety leadership standards in the organisation.
- Leaders do not collaborate internally or externally.

Culture
Staff consider there is little effective leadership in health and safety at any level of the organisation.

- Health and safety leadership skills and other non-technical management skills are not recognised or developed within the organisation.

Culture 'call-outs'

Guidance and further reading:

- INDG 277 'Leadership in the Major Hazard Industries': Health and Safety Executive (HSE)
- INDG 417 'Leading Health and Safety at Work': HSE

General layout for criteria, maturity levels and evidence factors

OC 6 Organisational culture

The significant ways of thinking and doing, which underpin a positive H&S culture suited to the organisation, are identified and applied.

Culture is a lever which can assist the board and senior managers to improve company and safety performance. Setting out a culture strategy for H&S as part of a SMS is a necessity for excellence.

Culture consists of the shared of ways of thinking and doing in respect of the most significant risks of the organisation, which underpin the approach to devising and implementing the SMS.

Current thinking suggests there are 'seven attributes of an integrated health and safety culture', these are shown opposite.

Different positive cultural characteristics may be more relevant to some parts of the business. For example, a just and fair reporting culture, may be more pertinent to enhance learning in front-line work, whereas a process safety culture of doubt, and a challenge culture of questioning, may be more relevant to those in engineering functions concerned with the high hazard systemic risks of the infrastructure.

Testing organisational culture and RM^3

There are different ways of finding out about an organisation's H&S culture:

1. By routinely gathering informal information about the H&S culture during monitoring, inspections, investigations and other dealings with employees, interfacing organisations and the supply chain. For instance, workers on site during a routine preventive inspection may comment that performance pressures sometimes take priority over risk controls. In this case, as well as investigating the allegation, the background should be recorded to build up a picture of the organisation's H&S culture.
2. Organisations can conduct H&S culture or safety climate assessments, using techniques and toolkits, such as the RSSB's Safety Culture toolkit. These assessments can provide useful information on the current safety culture, and provide information and views about leadership, communications, learning culture, employee involvement and attitudes to blame.
3. RM^3 is not intended to be a substitute for other safety culture assessment tools, but in this version there are highlighted 'culture call-outs' against every level of maturity in all criteria. Assessors using these 'call-outs" will see elements of the 'seven attributes' throughout the RM^3 criteria. The 'call-outs' suggest typical actions, beliefs and behaviours held by staff, at all levels, suggesting the culture of the organisation.

An explanation of how to collate and use the culture indications from the 'call-outs' is provided on pages 40 and 41.

Organisation Name:		Fenrail Limited					
Team/Area/Division assessed:		Whole Organisation					
RM^3 assessment by:		Alison Jones				Date:	23/11/18
		SP	OC	OP	PI & RCS	MRA	Row totals
Excellence	Continually improving						
Predictable	Cooperating	SP1 SP4			PI1 RCS4 RCS5	MRA5	6
Standardised	Involving	SP2 SP3	OC3 OC4	OP2	PI2 RCS1 RCS2	MRA3 MRA4	10
Managed	Managing		OC1 OC2 OC5	OP1	RCS3	MRA1 MRA2	7
Ad-hoc	Emerging				PI3		1
Not assessed			OC7				1
Organisational culture maturity indicated level		Standardardised/Involving					

Figure 6 Organisational culture template

OC6 – Organisational culture collation

How will ORR use RM^3 going forward ?

We are going to be more consistent and use RM3 with all our dutyholders ?

We will apply these fundamental principles

CONSISTENCY
QUANTITY
QUALITY
CURRENCY

We will engage with you and discuss our findings and yours before reporting on assessment levels

We will support you in using RM3

RM3 process in our quality management system

Moderation of RM3 assessments in all sectors

Our assessments will be evidence based

There will be refresher training for our inspectors

ORR's Annual health and safety report

Mainline: Train operating companies

Management maturity

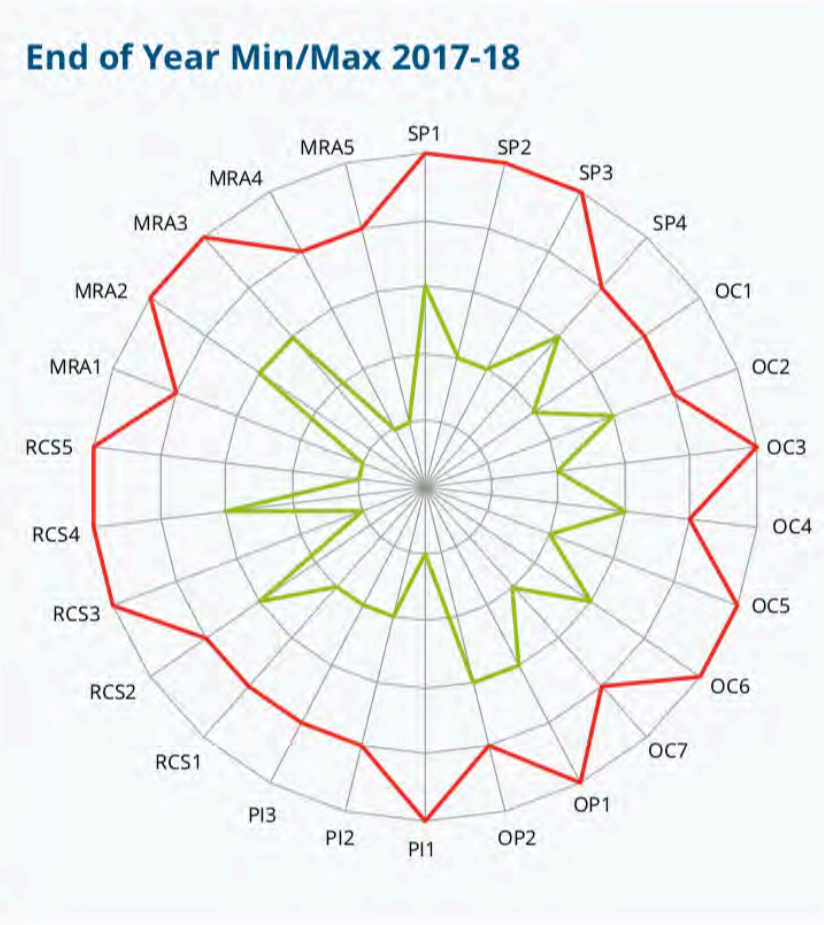
Overview: In 2017-18, we produced RM3 assessments for 16 TOCs. Six criteria were at AdHoc, Nine were at managed and 11 at standardised. In 2016-17, the numbers were Five at "AdHoc", 16 at "managed" and Five at "standardised". At the top of the range of assessed scores, 13 criteria were at "excellent", 13 at "predictable". In 2016-17, 16 were assessed at "excellent" and 10 at "predictable".

Overall, there has been an improvement in the management maturity of GB's TOCs. It is pleasing to see the 11 criteria where the minimum assessed value from all of the TOCs was "standardised".

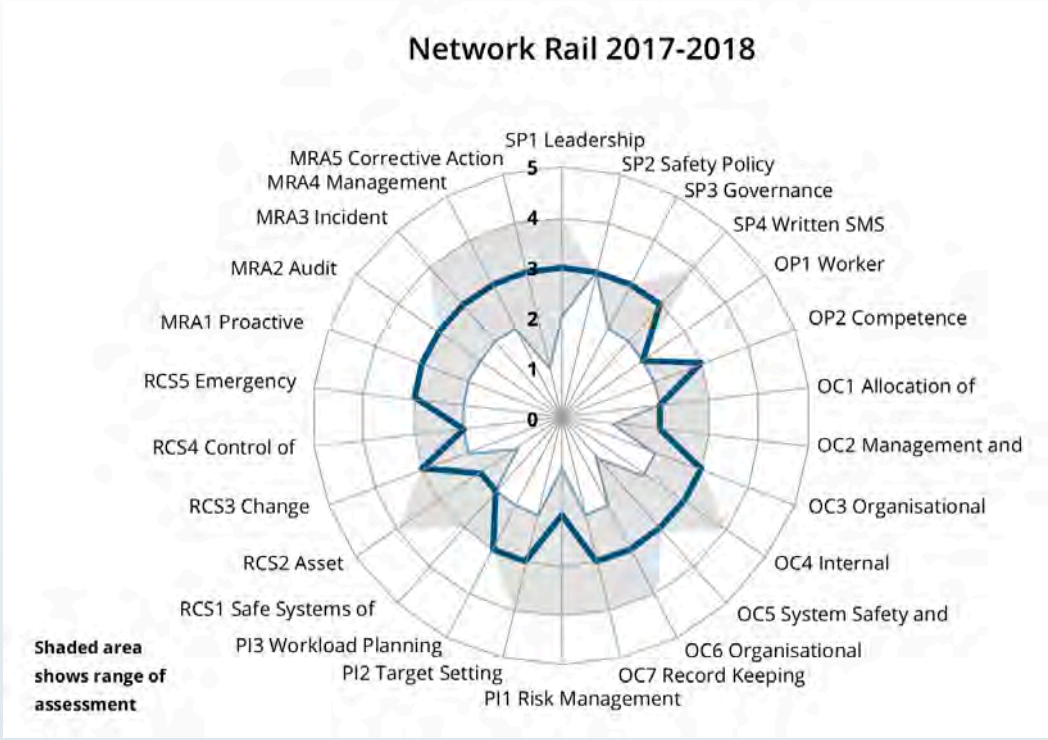
This year we have been required to dedicate more resource to respond to events, especially to ensure that the TOCs are managing the risks of prolonged industrial action effectively. We intend to return to a proactive inspection program driven by our strategic chapters.

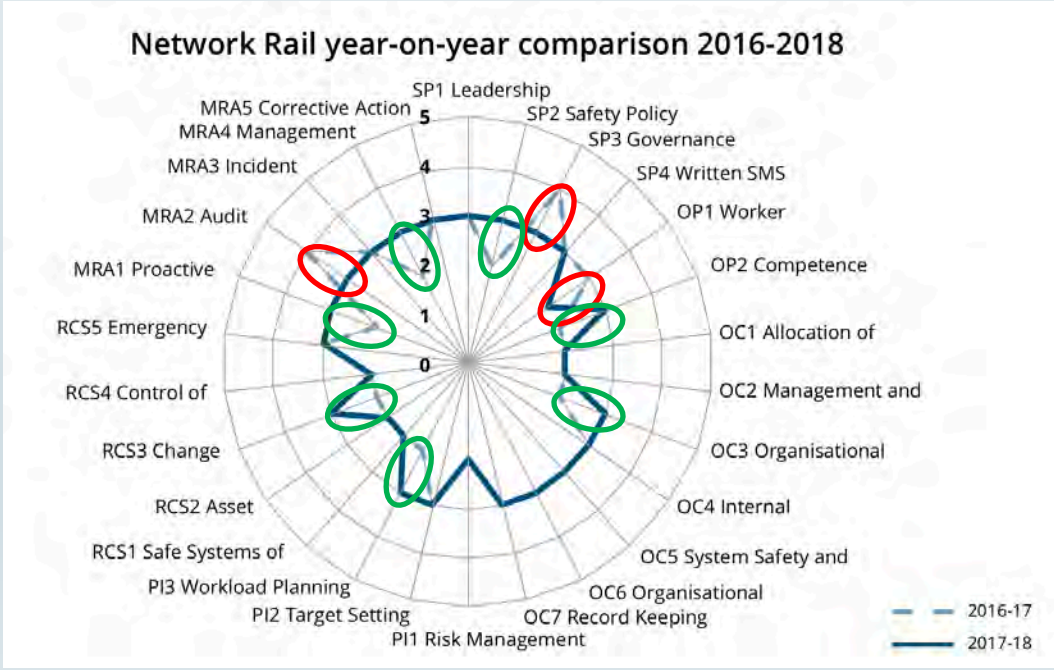
At Old Oak Common depot, a train maintenance worker lost their life during maintenance on a bogie, when a traction motor fell on to them. We continue to investigate this incident.

A sampled and composite RM3 assessment of train operators risk management maturity in 2017-18 with maximum scores (in red) compared to minimum scores (in green).



RM³ and Network Rail





We want you to use RM³ to improve your success and demonstrate your capability to manage risks:

- internally, and with your ORR inspectors, discuss the evidence found through all assessment work; to
- determine the good things, and not so good things, about your arrangements to control risks; and
- identify what you need to do to improve these arrangements and share your success with other railways

We have designed this new edition of RM³ to be more readily accessible to those just starting out with RM³ ….

…. we have thought about the needs of the heritage sector…..

….but the model also pushes boundaries of excellence for experienced users.

NORTH YORKSHIRE MOORS RAILWAY

SHARING OUR AUDIT EXPERIENCE

LIZ PARKES, HEAD OF OPERATIONS & SAFETY

REGULATORY FRAMEWORK & STANDARDS

ROGS: competence, safety management systems, risk assessment, management of engineering change, (use of common safety methods and safety verification for non-mainline and light rail operators)

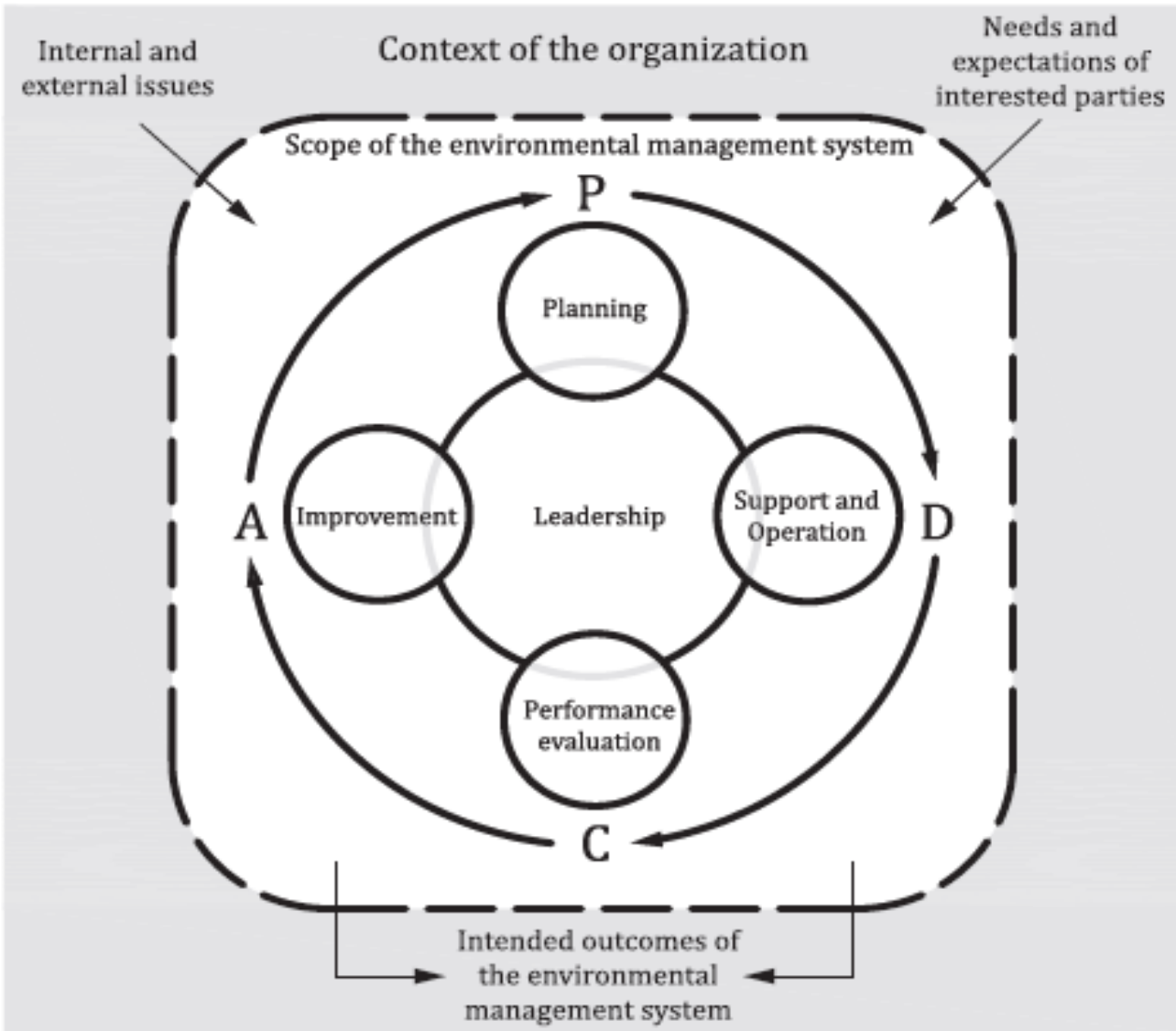
Environmental legislation

BS/EN/ISO 14001: 2015

- Organisation – scope, interfaces, description, policy safety management, planning, management accountability, workforce involvement, monitoring
- Management of change
- Risk assessment and risk control
- Competence
- Provision of information
- Incidents
- Emergency planning
- Audit
- Co-operation

MEETING SAFETY REQUIREMENTS

Railways and other guided transport systems (Safety Regulations) 2006



MEETING ENVIRONMENTAL REQUIREMENTS

BS/EN/ISO 14001: 2015

Environmental Protection Act 1990 and regulations under the act

COMMON CONCERNS

Show stoppers: fire, collision, derailment

Platform train interfaces

Shunting

Heritage stock - sub optimum ergonomics

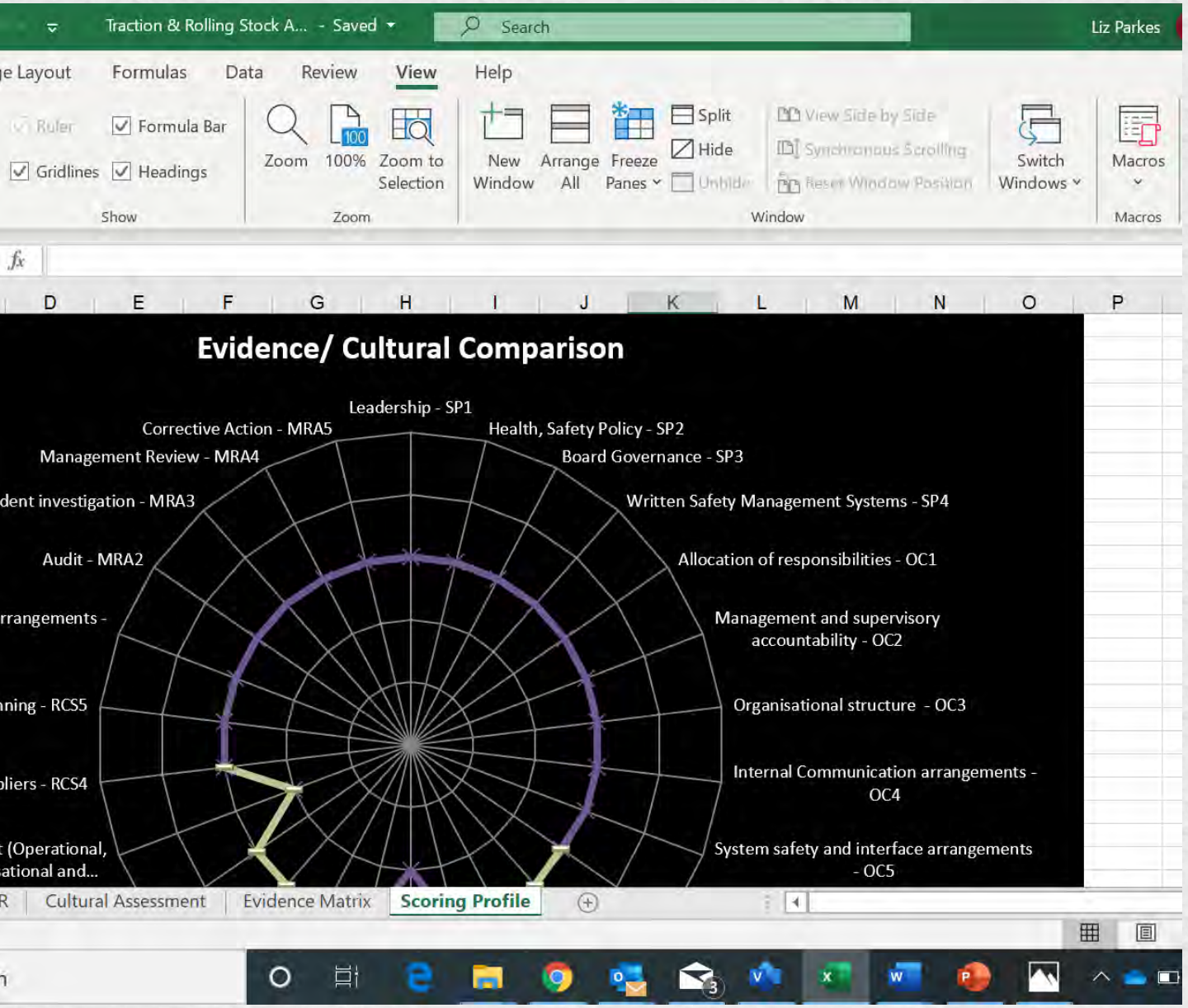
Signalling systems

Rail/road vehicle and pedestrian interfaces

Congestion

Noise and vibration, water, land and air pollution avoidance

Accessibility



HOW ARE WE DOING ?

1. Ad hoc ?
2. Managed ?
3. Standardised ?
4. Predictable ?
5. Excellent ?

OC7	Record keeping	3
OP1	Worker involvement	3
OP2	Competence management	3
P13	Workload planning	4
RCS1	Safe systems of work	3
RCS2	Asset management	3 large 2 small
RCS3	Change management	2
RCS4	Control of contractors	3

TRACTION & ROLLING STOCK AUDIT 2019

NYMR

NORTH YORKSHIRE
MOORS RAILWAY

SHARING OUR EXPERIENCES

HOW DO WE BEST LEARN FROM EACH OTHER ?

ORR protects the interests of rail and road users, improving the safety, value and performance of railways and roads today and in the future

RM³*2019* for the Heritage Sector

Ian Skinner

Assistant Chief Inspector of Railways
Office of Rail and Road

RM3 Topic Sets

- RM3 Topic Sets
  - To provide focused assessment of key risk management areas
    - E.g. Occupational Health, Infrastructure management
  - Support the RM3 approach in a targeted manner
- Potential to support RM3 introduction into the Heritage Sector
  - Accessible
  - Meaningful
  - Useful

RM3 Topic Set – Heritage Railways

- Nine criteria over the 5 themes
- Retain the 5 maturity steps – ad-hoc thro' excellence
- Meaningful descriptors for each maturity level
  - Plus governance descriptors
- Under development
  - Ready to test first draft
  - Asking for your help and input

The nine criteria

Health and safety policy, leadership and board governance	SP1	Leadership	SP
	SP3	Board governance	
	SP4	Written safety management system	
Organising for control and communication	OC7	Record keeping, document control and knowledge management	OC
Securing co-operation, competence and development of employees at all levels	OP2	Competence management system	OP
Planning and implementing risk controls through co-ordinated management arrangements	PI1	Risk assessment and management	PI
	RCS2	Management of assets	RCS
Monitoring, audit and review	MRA2	Audit	MRA
	MRA3	Incident investigation	

SP1 Leadership
SP3 Governance
SP4 Written safety management system
OP2 Competence management
OC7 Record keeping
PI1 Risk management
RCS2 Asset management
MRA2 Audit
MRA3 Incident investigation

Testing the approach

- Draft Topic set produced
- Use in practical applications
- Provide feedback

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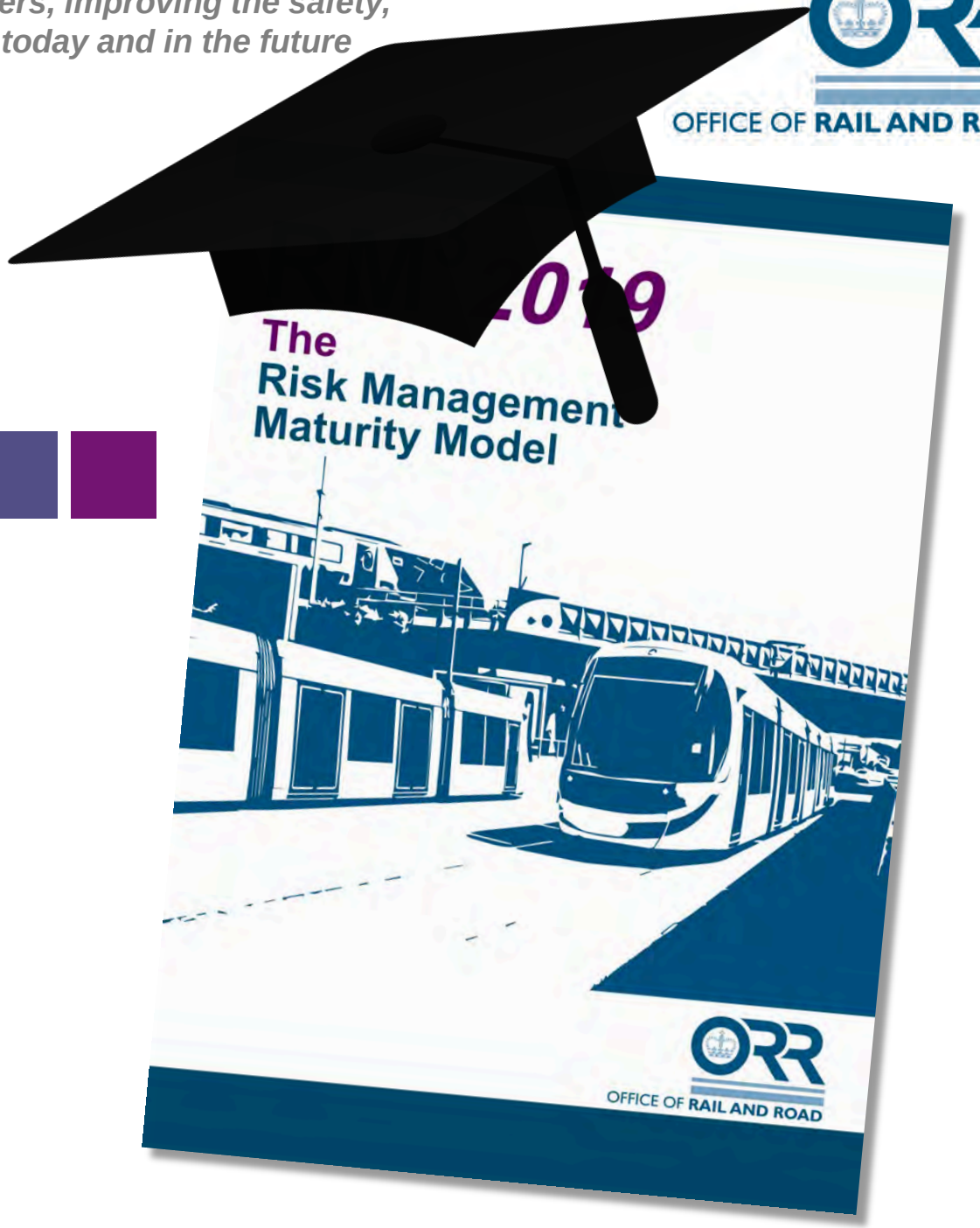
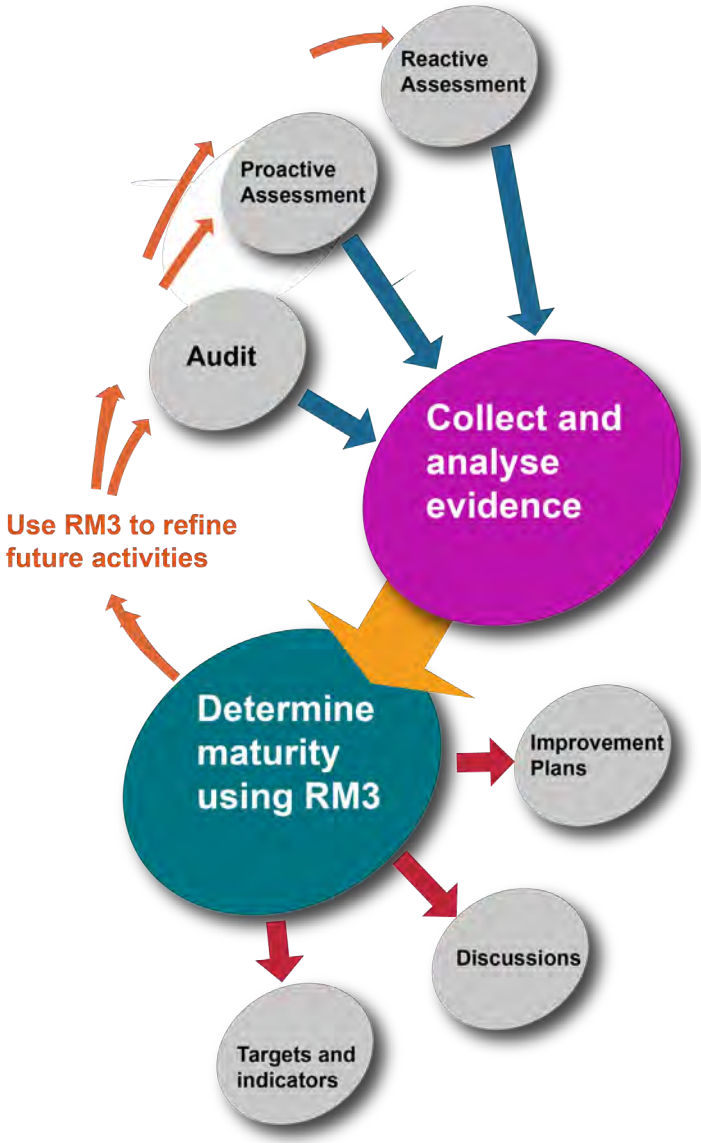


RM3 *2019* PRACTICAL

What evidence?



Reactive assessment includes:

- Workplace violations and errors
- Incidents
- Failures to deliver performance objectives
- Complaints

Proactive assessment includes:

- Risk control system review
- Safety verification activity
- Safety certification/authorisation assessment

Audit includes:

- Top down SMS reviews
- Corrective action monitoring
- Internal and external audits

Assessing principles

Health and safety policy, leadership and board governance	SP1 Leadership SP3 Board governance SP4 Written safety management system	SP
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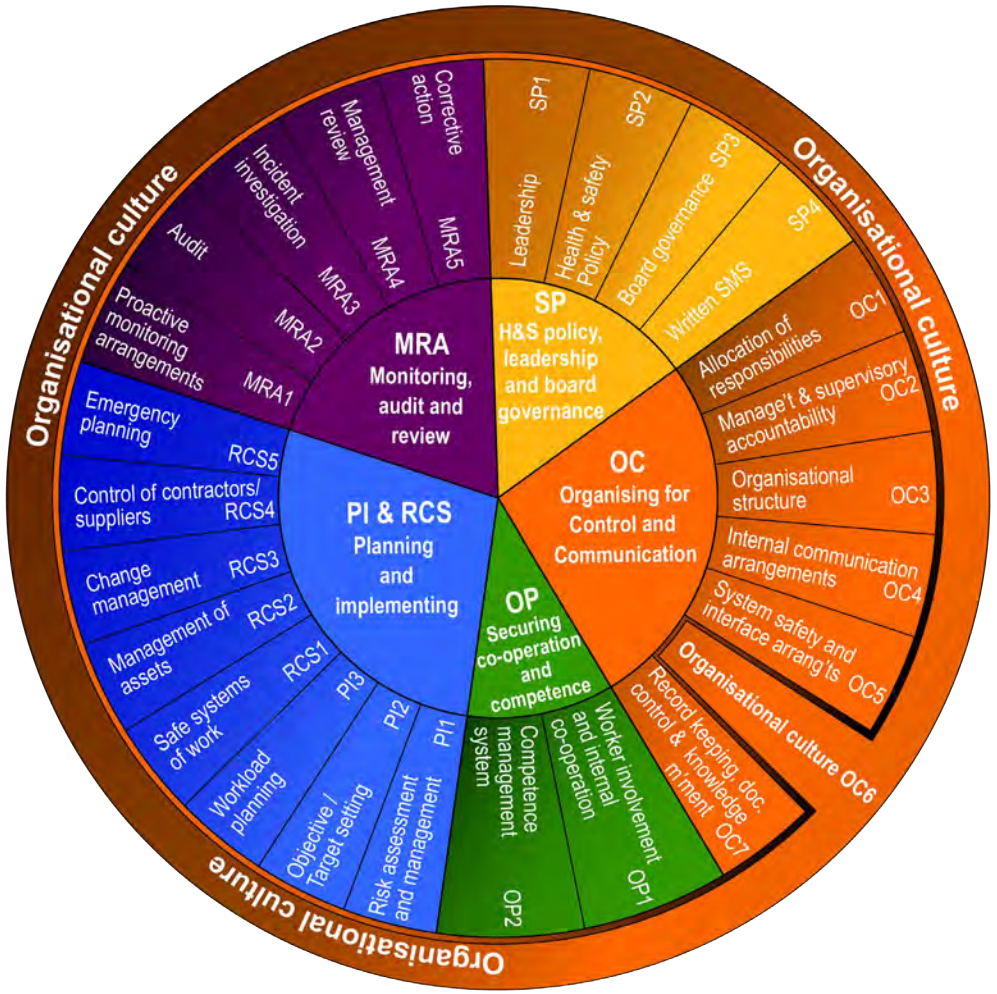

SP 1

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- Identifying and promoting the styles of leadership and management practices at all levels, which best support a positive health and safety culture;
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Excellence

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- Leaders search within and outside the organisation for opportunities to improve risk control in their area of the organisation to ensure it is as effective and efficient as possible.
- Leaders always consider how they influence others, recognising that good leadership is compelling not coercive.
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Culture
Leaders recognise they have an obligation to foster the kind of organisational climate where people find it easy to speak up and share when they have made mistakes rather than covering up errors.

- Leaders encourage people and enable them to join forces and to participate as responsible individuals in a collaborative institutional enterprise.
- Non-technical management skills development is recognised as world class.
- Leadership demonstrates and reinforces the values and culture of the organisation and ensure these lead to engagement and empowerment across all layers.

Predictable

- Leadership activities are consistent with and reinforce the organisation's health and safety policies.
- Leaders at all levels of the organisation are credible and open to ideas for improvement.
- Leaders take responsibility to ensure that the health and safe management system achieves its intended outcome.
- Leaders inspire others within the organisation to work to deliver against the H&S vision of the organisation.

Culture
Leaders take responsibility for developing, leading and promoting a positive culture in the organisation that supports effective H&S risk management.

- Non-technical management skills are recognised and developed within the organisation.

SP 1

Standardised

- The organisation is built around a command and control structure with some feedback.
- There is a rule book-based approach to health and safety management, this can result in unwavering adherence to standards with little innovation or flexibility.
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- Some collaboration occurs but often by chance rather than planned, and depends on the individuals involved rather than being systematic.

Culture
Leadership is viewed solely as a senior management role.

- There is no consistency over how non-technical management skills are developed in the organisation.

Ad-hoc

- There is no evidence of positive health and safety leadership at any level in the organisation.
- Health and safety leadership is not considered to be important in staff development.
- No effective application of health and safety leadership standards in the organisation.
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ORR OFFICE OF RAIL AND ROAD

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ORR OFFICE OF RAIL AND ROAD

Example Company: Mid-Fens Heritage Railway

- The Mid-Fens Heritage railway runs on 8 miles of single track between Outwell and Whittlesey;
- Operates a mixed fleet with steam locomotives and mk1 stock, 1 DMU and 1 DEMU;
- Outwell is a two track station with a headshunt
- Whittlesey is a single track terminus with run-round facilities
- There is an island platform within a passing loop at the intermediate station at Elm Drove; and some level crossings.
- There are workshops and stabling at Outwell, where restoration is also a major activity.
- Staffing includes
  - 35 full-time employees
  - 400 regular working volunteers

Scenario

- You are to carry out an assessment of the Mid-Fens Heritage Railway management system using the RM3 heritage topic set;

- You have a number of different sources of evidence;
  - Train dispatch monitoring report;
  - Station masters report;
  - Email with ISO 45001 accreditation;
  - Email about performance monitoring workshop;
  - ORR inspector’s contact notes re: complaint from member of the public;
  - Copy of email from Safety Rep to Health and Safety Manager;
  - Safety Reps’ inspection report

Instructions

- For each piece of information;
  - Identify the relevant RM3 Criteria;
  - Determine the level of achievement using the RM3 guidance;
  - Have you got any culture evidence? …..and what is the maturity level??
  - Record the results and plot on the RM3 graph;

- Remember that there may be different levels of performance for different pieces of evidence.

ORR / HRA RM3 2019 Seminars

SEVERN VALLEY RAILWAY
03 December 2019

ORR protects the interests of rail and road users, improving the safety, value and performance of railways and roads today and in the future

ORR's approach and 'an inspector calls'

Steve Turner

HM Principal Inspector of Railways
Office of Rail and Road

ORR's vision for GB's Railways

- ***Zero workforce and industry-caused passenger fatalities, with an ever decreasing overall safety risk***

- ***ORR perception* on heritage passenger's expectations:**
  - **'*1950's experience' with 2019 levels of safety and service***

- **Increasing ORR's capability in the heritage sector**
  - **Supervision – greater presence on the ground**
  - ***RM3 type* support tool**
  - **Approach to supervision**

A bit of credibility: my class 47 at GCRN on a Santa train 10/12/17

Austerity ‘Whiston’ on the 26th May 2019

175 years of railway safety
1840 – 2015

1825
First locomotive-pulled passenger railway opens

1830
William Huskisson was the first death on a public railway at the opening of the Liverpool and Manchester Railway when he was run down by Stephenson's Rocket.

1833
Bagworth: Collision with farmer's cart on level crossing, led to the implementation of the locomotive whistle.

1840
Railway companies required to give one month's notice of intention to open a new railway.

1840
Railway Inspectorate founded.

1841
Railway accident at Sonning Cutting: Train ran into landslide caused by heavy rain. 8 killed and 17 injured. Initiated the concept of Parliamentary trains and that all should be conveyed at the same level of safety.

1842
Railway Inspectorate given powers to postpone the opening of new railways on safety grounds.

1871
Railway Inspectorate given powers to investigate accidents and recommend ways of avoiding them.

1889

Armagh rail disaster: Runaway carriages collide with following train. 80 killed and 260 injured. Inspectorate drives legislation quickly through Parliament that mandates continuous brakes, locking of facing points and block signalling.

1900

Railway Inspectorate given powers to investigate accidents to railways staff.

1911

Railway Inspectorate moves from Board of Trade to Ministry of Transport.

ways of avoiding them.

1872

Bridge of Dun boiler explosion : Until the introduction of systematic boiler examinations by a 'competent person' commenced in the mid 1850s (mainly driven by the Royal Navy) boiler explosions were not uncommon.
In the 19th century there were 122 railway boiler explosions but just 15 in the 20th century.
Risks from boiler explosion are considered so serious that ORR still publishes guidance on the approach to be taken.

1879

Tay Bridge disaster. Bridge collapsed under train in a gale.
75 estimated killed. Parliament set out that safety rests with the railway company and not with the Inspectorate.

1889

1915

Quintinshill collision, 22 May; 226 killed, 246 injured: Troop train hit local standing train and 2 coal trains; another train hit wreckage caused by mistakes by signalmen. The greatest loss of life in any British train accident. Drives the end of gas lighting in carriages and improves enhanced crash worthiness.

1935

Welwyn Garden City rear-end collision caused by signalman's error. 13 killed and 85 injured.
Drove improvements in signalling systems to assist the signaller.

1948

Railways nationalised.

1951
First heritage railway approved - Tallyllyn.

1952
Harrow and Wealdstone rail disaster:
Train ignored signals, rear-end collision with stationary train, train travelling in the opposite direction ran into wreckage.
112 killed, 340 injured. The greatest peace timeloss of life in a railway accident.
Started the long road to automatic train protection.

1957
Lewisham rail crash. Missed signals in fog, rear-end collision with another passenger service.
Overbridge fell on wreckage when bridge's abutment struck by derailing locomotive and carriages.

1967

Hither Green rail crash: Hastings to Charing Cross service derailed at 70 m.p.h. due to broken fishplate. 49 killed and 78 injured.
Drove the introduction of continuous welded rails.

1984

The Polmont rail accident, when a westbound push-pull express train travelling struck a cow.
All 6 carriages and the locomotive of the train derailed, killing 13 people and injuring 61 others. The accident led to a debate about the safety of push-pull trains on British Rail.
This led to reccomendations for object deflectors to be fitted to the leading vehicles of all trains with an axle load of less than 16 tonnes and that headlights were to be fitted on the front of all trains.

1987

Kings Cross fire: 31 people died and 100 were injured. The fire started on an escalator serving the Piccadilly line and 15 minutes after being reported, the fire flashed over, filling the underground ticket office with heat and smoke.
Reconstruction of the fire's sudden increase in intensity revealed the previously unknown 'trench effect' which fundamentally influenced future underground station design.

1988

Clapham Junction rail crash:
Rear-end collision, oncoming train ran into wreckage: wrong-side signalling failure due to wiring error. 35 killed, 100+ injured. Principle underlying cause identified as fatigue.
Drove the control of working hours for safety critical staff.

1989
Purley Station rail crash, missed distant signal, overshot signal at danger; rear-end collision, part of train down embankment.
5 killed, 90 injured.

1989
Railway Inspectorate moves to HSE.

1991
Cannon Street Station rail crash: Passenger train hit buffer stop. 2 killed, 542 injured.

1994
Cowden rail crash, Kent:
Signal passed at danger; head-on collision.
5 killed, 13 injured.

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The accidents from 1988 to 1994 drove the removal of mark 1 rolling stock from the network, resulting in the 1999 Railway Safety Regulations that finally prohibited Mark 1 carriages.

1994
First female inspector appointed to HMRI.

1994
Railway privatised.

1994
Introduction of safety case regulations – operators must demonstrate that safety practices are followed.

1996
Watford Junction: Signal passed at danger; empty coaching stock collided with stationery passenger train 700m south of Watford Junction. 1 killed, 69 injured.

1997
Southall, rail crash: Signal passed at Danger, High Speed Passenger Train collided with a freight train. 7 passengers killed and 150 injured.

Number of recommendations made, covering driver training and research into driver behaviour, crashworthiness and fleet maintenance.

and fleet maintenance.

1999

Ladbroke Grove rail crash. Driver passed signal at danger; head-on collision and fire; allegations that signal (SN109) was hard to see. 31 killed, 523 injured.

Finally drove the Inspectorate to legislate requiring the national roll out of TPWS and incorporated prohibition of Mark 1 rolling stock, only the second time that the Inspectorate has legislated.

2000

Hatfield: 4 killed, 70 injured when an Intercity express travelling at 115 mph derailed south of Hatfield due to a rail fracturing as the train travelled over it.

2001

Great Heck, near Selby North Yorkshire: 10 killed, 82 injured when a land rover and trailer ran down an embankment onto the railway tracks and was hit by a intercity train which was then deflected into the path of an oncoming freight train carrying coal. Drove improvements to reduce the likelihood of vehicle incursion at critical high risk locations.

2002

Potters Bar: 7 killed, 76 injured when a passenger train derailed at poorly maintained points south of Potters Bar and carriages came into contact with the platform at the station.

2005
Elsenham, Essex: 2 teenage girls killed by a train while using the station's pedestrian level crossing. Drove the on-going closure programme of level crossings and significant improvements in risk assessment and ownership, with the creation of level crossing managers.

2005
Last of the slam door trains following concern about fatalities due to falls from moving trains.

2006
ORR and HSE Railway Safety merged.

2007
Grayrigg derailment. Train derailed over a set of faulty points.

7 killed and 88 injured. Drove improvements in railway management and culture.

2014-19
ORR's second occupational health programme.

2015
Driving for excellence in the railway industry.

OFFICE OF RAIL AND ROAD

Some comparisons

Year	Worker fatalities	Pass + public fatalities	Suicide	Trespass	Nr of Pass mainline	Nr of Pass LUL
1874	788					
1983	28	69	212	146	695M	585M
1993	11	39	108	136	769M	787M
2015	4	14	293	22	1,600M	1,300M
2018-19	2	44	302		1,759M	1,384M

No passenger fatalities as a result of a train accident since 2007 (Grayrigg)
No heritage railway fatalities since 2012 when a guard was crushed whilst shunting

To put into 19th century perspective (1)

- ***The honourable Gentleman the Member for Belfast mentioned the relative risk of life between railway-men and soldiers. I have this comparison to make; that there were 29 British soldiers killed at the battle of Khartoum, and that there were 501 railway-men killed on our railways last year. There were 148 killed in the Balaclava charge, and there are considerably more shunters and brakesmen killed every year in the industry of our railways. It seems to me to be a curious fact that the man who is paid for getting killed rarely gets killed. In 15 years, from 1872 to 1886, out of 1,407,000 troops liable to be engaged in battle, there were only 1,396 killed in action, and in that same period of 15 years there were 8,400 men killed on our railways, and a total of 6,500 civilian workmen killed in the same period.***

To put into 19th century perspective (2)

- ***We cannot permit this wanton sacrifice of human life to go on. Officers in the Army and Navy, to their credit be it said, look after the protection of their men, and do everything in their power to prevent the needless slaughter of those who are placed under their command.***
- ***Unfortunately, we have not, in relation to our railwaymen, officers who take up the same position with regard to the railway industry as a Colonel of a regiment does with the soldiers under his command. The nearest substitute to that kind of a man in the railway world is the President of the Board of Trade.***

To put into 19th century perspective (3)

- ***Every year in this industry there are 500 men killed, and 67,000 more or less injured. They are killed by the neglect of the most elementary causes, and through the lack of administrative control which the right, honourable Gentleman himself can provide, and I would respectfully suggest to him that instead of allowing Colonels of the Royal Engineers to be present at a coroner's inquest after a railway accident has happened he should appoint sub-inspectors and Chief Inspectors of railways to examine lines and to make suggestions, and their advice should be forced upon our railway companies, and if he does that I am sure that the 50s per cent. diminution of accidents in America which we have witnessed will be followed by a remarkable diminution in the number of men injured and killed in this country.***
- **John Burns MP for Battersea (in 1899 on a debate about automatic couplers for railways)**

Heritage railway numbers: source HRA

- 200 plus heritage railways
- 2016 HRA figures (2/3): 9.6m passengers, 562m of line, 460 stations, 11.7m visitors resulting in revenue of £130m
- 2,867 full time employees; 21,659 working volunteers
- 790 steam locomotives
- 1021 diesel locomotives
- 268 DMU
- 2176 carriages and 3950 wagons
- HST power car and six Mk3 carriages at GCRN (as below)! 41001 returning to NRM and two production power cars donated by ROSCO

Stop

Any latin scholars

- Sales populi suprema lex esto

Translation

- “Let the good (or safety) of the people be the supreme (or highest law)”
- Marcus Tullius Cicero (106 BC to 43BC) - Roman Politician and lawyer
- So good health and safety is nothing new!

Origins of modern safety legislation

- Industrial revolution: first Factory Inspector in 1833, £1000 pa.
- Dark satanic mills, children and women in the mines, bad conditions in most of industry – notable exceptions such as Titus Salt at Saltaire, Joseph Rowntree of York or Cadbury's in Bourneville, Birmingham: "model villages".
- Various Factories Acts / Regulations throughout history to date.
- HSWA 1974 following Robens Report http://www.hse.gov.uk/aboutus/40/robens-report.htm
- 21st October 1966: Aberfan (116 children, 28 adults died) https://en.wikipedia.org/wiki/Aberfan_disaster
- Edwards v NCB All ER 743 CA https://en.wikipedia.org/wiki/Edwards_v_National_Coal_Board
- Risk assessment

Perhaps a reason for safety inspectors?

- *“We do not believe any group of men adequate enough or wise enough to operate without scrutiny or without criticism. We know that the only way to avoid error is to detect it, that the only way to detect it is to be free to inquire. We know that in secrecy error undetected will flourish and subvert.”*
- J Robert Oppenhiemer 1904-67 – Father of the atomic bomb
- *There’s an old saying that if you think safety is expensive, try an accident. Accidents cost a lot of money. And, not only in damage to plant and in claims for injury, but also in the loss of the company’s reputation.”*
- Professor Trevor Kletz

Requirements

- HSWA 1974 Sections 2(1), 3(1), 4, 6, 7, 36 and **37**
- Powers of Inspectors (IN, PN, Legal Proceedings – triable either way)
- Penalties
- Regulations such as
- Railways and Other Guided Transport Systems (Safety) Regulations 2006. Heritage based on 25mph, SMS (RB, Competence, Maintenance and Risk Assessment)
- PSSR 2000, PUWER 2008, WAH 2006, LOLER 1998, EAW 1989, COSHH 2002, CAW 2012, CLAW 2002, NAW 2005

Recent events

- **Two trains in one section running towards one another. Staff and ticket system broke down: Abermule 26/01/21 – 17 died. Happened quite a few years ago on another heritage railway!**

  In summary:
  a ticket could be issued without staff present

  No clear understanding between Signaller and Trainee Stationmaster as to what movements were planned

  Trainee not qualified in staff and ticket working and prepared a ticket without staff in his possession – staff on train coming towards him

Recent events

- **Driver accepted ticket without seeing the staff**

  Station master did not adequately supervise the trainee

  https://www.gov.uk/government/publications/safety-digest-082019-romney-sands/serious-operating-irregularity-at-romney-sands-28-august-2019

- **(OP2 Competence Management System)**

Droplight windows: young man died on the mainline when his head hit a close structure. A number of fatalities since 1999 including Clayton Tunnel and Denmark Hill plus near misses. TOC fined £1m plus £52k costs on 17/07/19.
https://orr.gov.uk/news-and-blogs/press-releases/2019/gtr-fined-after-man-killed-on-the-gatwick-express

Letter to HRA and about forty heritage railways. Risk Assessment and necessary actions. Including moving nearby structures, vegetation clearance, train announcements, improved droplight door signage, ticket information, window bars as a last resort.

Bash Mash Kevin https://www.youtube.com/watch?v=pSQzSs56jVE and The Bashers https://www.youtube.com/watch?v=VUFm2rWn41g

Droplight windows continued

Some adverse comments from enthusiasts as believed no fatalities since 1960 on heritage railways! Some that come to mind follow:

No names but:

Guard crushed to death between two carriages whilst shunting
Guard caught between two buckeye connection
Passenger run over by train when he was running for train and slipped
Farmer in collision with a train on a crossing on a standard gauge line
Three died in separate incidents on a narrow gauge line
Fireman hit his head on a bridge whilst in tender shovelling coal forwards
Surveyor crushed by jib of crane whilst undertaking LOLER inspection
Fragile elderly lady died some months later after falling under a train

Mark 1 corrosion: not just Mk1s 30 year life, now double.

Standards such as CMS 123, BR10906/7 don't consider corrosion.

Heritage railways must inspect and invasively if necessary.

SMS requirements including subsidiary documents

Development of suitable maintenance standards and records: each carriage needs its own folder / record!

Need for own wheel profile and buckeye gauges (or borrowed).

HOPS or other digital recording system. Some paper records very poor or sketchy. If records are poor what does that imply re the rolling stock.

Days of heavy general repaints are over. (RCS2 Management of Assets, OC7 Record keeping, document control and Knowledge information)

Some non fatal and other incidents (1)

- Gas main strike
- Volunteer tripped over steel plate # hip / another fell & fractured shoulder
- Passenger tripped at toilet entrance on platform # hip
- Dropped fusible plugs (OP2 Competence Management System)
- Signals Passed at Danger (lots) (OP2 Competence Management System)
- Passenger train buffer fell off due to broken shaft – others examined and had potential problems (RCS2 Management of Assets)
- Derailments for a variety of reasons – latest only last week
- Platform despatch incidents: some on CCTV – quite useful!
- Falls from height: # broken sternum / # shoulder blade (RCS1 SSoW)

Some more incidents (2)

- Collapsing large ‘A’ frame in course of movement (OP2 Competence)
- Near crane overturn: no lift plan, weight of load unknown, outriggers and springs stops not deployed, non functioning ASLI, operator unable to show competence, outside wheels lifted off rails, CCTV. If gone over would have resulted in possible prosecution (OP2 Competence)
- SPAD and subsequent collision resulting in PN being served (RCS1 Safe System of Work)
- Light engine runaway, trolley, ECS, brake van runaway (RCS2 Management of Asset, RCS3 Change Management)
- Collision between car and passenger train on Open Crossing
- Other AOCL collisions
- Child fell from moving train as door was opened
- Low speed light engine and stock collision during station move (OP2 Competence)

- Plant shed burned to the ground

Some more incidents in 2018 / 19 (3)

- Locomotive failures of varying kinds: eg top water cock handle blew out, piston failure, gauge glass and frame failure (RCS2 Management of Assets)
- Permanent Way issues in general (RCS2 Management of Assets)
- Operational incidents: lots of SPADS, two trains in section, trains in section without staff etc
- Near blinding of volunteer from flying ballast chip (RCS1 Safe System of Work)
- Locomotive running into MPD and damaging other locos (OP2 Competence Management System)
- Near misses at level crossings – particularly AOCL
- Passenger train division in 2019 – four in 2017 (RCS2 Management of Assets & OP2 Competence)
- Excessive speed – in forties on passenger trains! (OC2 Management and Supervisory Accountability)

Other issues

- Safety critical components: rivets, tubes, C107 copper etc
- Health: done work with lead, asbestos, effluent discharge etc
- Work with LAs – noise and smoke etc
- Statutory Inspection: eg Level Crossing Orders
- Complaints and Inspections: complaints are many and varied – just about anything you can think of
- Extra resource: Simon Smith joined the heritage team on a permanent basis in April 2019 (26 years as an Inspector) and looks after SE and SW England. Revolving six month secondments for trainees into heritage: as from 21/10/19 Andrew Clapp. This will allow for proactive inspections to occur inc RM3!

Common themes (1)

- **Primary control for H&S is the SMS: Bell curve or normal distribution: Improvement Notices served down the years (SP4 Written SMS)**
- **Competence or sometimes inability to demonstrate: couple of railways as at Nov 2019 not running at present - one with PN (OP2 Competence Management.)**
- **Age / medical fitness: self assessment questionaires / formal medicals for footplate staff (OP2 Competence Management)**

Common themes (2)

Assessment / reassessment (Open v closed book and periodicity of same) (OP2 Competence Management System)

Maintenance: T&RS, p'way, structures, signalling. One railway currently non operational partly due to inability to show proper maintenance. OC7 Record keeping, document control and knowledge management & RCS2 Management of Assets

Need to assess those undertaking maintenance work, inspection (eg track patrolling or FTR) etc Don't forget workshop competence! (OP2 Competence Management System)

Common themes (3)

- **Standards for maintenance sometimes poor or not available! Make use of internet: eg Locomotive Manufacturers Handbook 1949 @ https://www.martynbane.co.uk/tech/steam-tech.html (OC7 Record keeping, document control and knowledge management, RCS2 Management of Assets and OP2 Competence Management)**
- **and MT 276 examination schedule on the internet @ http://www.tonysimons.me.uk/bestt/ewExternalFiles/MT276.pdf Boiler Code of Practice @ https://www.hra.uk.com/guidance-notes**
- **Rolling stock standards on internet and HRA website https://www.hra.uk.com/br-maintenance-specs**
- **Work with other railways to determine common standards: too much reinventing the wheel (OC5 System safety and interface arrangements)**

Common themes (4)

Records: again like the proverbial “curates egg” . Very important to allow a railway to demonstrate say maintenance or competence etc. Many railways are exemplary but some are woeful. As above the normal distribution describes many aspects of heritage railways (OC7 Record Keeping, document control and knowledge management)

Move to digital record keeping where possible: standards / procedures / rostering / boiler washouts / mech exams etc (OC7 Record Keeping, document control and knowledge management)

Corporate Governance and Leadership: not always adequate (Self evident which criteria)

Some of my prosecutions

- 2002: commuter train derailment in South London due to gauge spread. Prosecuted both the IC and IMC (RCS2 Asset Management & OC7 Record Keeping)
- Nov 2004: IC and IMC were fined a total of £285,000 following death of an eight year old girl who was electrocuted by third rail. (RCS2 Asset Management)
- March 2006: an employee lost part of his hand whilst fitting new pads to brake discs of Mk 3 rake in the depot. (Two non connected workstreams underway on a rake plus loco at same time (RCS1 SSoW & SP4 Safety Management System)
- June 2007: employee received a 25kv electric shock whilst working on top of a class 86 in a depot. He was lucky to survive. £30,000 (RCS1 SSoW & SP4 Safety Management System)
- July 2012: 450kg rail dropped on to a volunteer on a heritage railway: severe leg injuries. £5,000 fine imposed (RCS1 SSoW & SP4 Safety Management System)

More prosecutions

- May 2010: boiler inspector fined following inadequate boiler inspection of a standard gauge steam locomotive. (OP2 Competence)
- 2011 – overgrown UWC with missing gate and other tied back: train / car collision. £4000 fine (RCS2 Asset Management)
- June 2016: TOC and driver fined total of £200,000 following significant SPAD at Wootton Bassett. Brake safety system isolated. (OC2 Management and Supervisory Accountability)
- May 2018: missing floor in Mk1 – child fell onto bogie: £40k fine plus £13k costs (RCS2 Asset Management)
- July 2019: mainline TOC fined £1m plus £52k costs re death of a passenger at a droplight (PI1 Risk Assessment & Management)

Some Improvement and Prohibition notices

- Lots (around 14) to do with inadequate safety management systems: all complied with (SP4 Written Safety Management System)
- Condition of level crossing (RCS2 Management of Assets & SP1 Leadership)
- Many month closure of a heritage railway due to condition of track, lack of competence of staff and very poor operating practices (SP1 Leadership, OC6 Organisational Culture, OP2 Competence Management, RCS1 SSoW and RCS2 Management of Assets)
- Voluntary cessation of operations for many months on another railway due to similar problems (As above)
- PN re all operations: (OP2 Competence Management, 0C7 Record Keeping, document control and knowledge management), and RCS2 Management of Assets)

Going forwards

- Increased resource in heritage team: plan of work to include proactive inspections
- Risk based approached to plan of work targeting a number of higher priority dutyholders
- Criteria for risk includes: passenger numbers, route miles, numbers of staff / working volunteers. Level crossings, t&rs, previous history
- All based on lower risk than the mainline due to maximum speed of 25mph (not average as once believed by members of one railway)!
- That said trains are sometimes heavier and most assets and staff are certainly older than the big railway

Key areas for inspection

- Safety Management System – bedrock
- Governance and leadership
- Asset management including p’way, structures, t&rs, level crossings, workshops
- Competence management
- Occupational health to include asbestos, lead, welding fume etc
- We will be using RM3 ourselves but using just third of the criteria: individual railways can use more or less at a periodicity of their choosing.
- Opportunity to compare dutyholders and HMRI evaluations over time
- RM3 could lend itself to other issues: finance or commercial activites

Selected criteria for our inspection work (1)

- SP1 Leadership and SP3 Governance: key to the successful management of health and safety risk is effective Leadership and Governance : former to set and communicate a clear direction and required standards, and act in a consistent manner to reinforce the required behaviours; the latter to make sure the organisation is accountable for the management of risk, and has effective arrangements in place..
- SP4 written SMS arrangements: to help understand the capability of the written safety management system, and identify areas for development.
- OP2 Competence management; Essential that all heritage railways can have arrangements that can **demonstrate competence** in all safety critical functions.
- OC7 Record Keeping; dovetails with OP2 & RCS2 to allow dutyholders to demonstrate competence (and maintenance, operations etc)

Selected criteria for our inspection work (2)

- PI1: Risk Management – simple risk matrices to demonstrate that risk have been identified, mitigations identified and prioritised for action.
- RCS2 Asset Management; how railways inspect and maintain their assets; be it traction and rolling stock maintenance, permanent way and structures. The SMS should determine scope, standards and periodicity and records must be readily available. (Similar to competence).
- MRA2 Audit: some internal auditing would be very useful to dutyholders. An area for development in most operators.
- MRA3 Incident investigation: Such investigations need to be robust with correct conclusions, pertinent recommendations and importantly follow up to ensure they are implemented.

Questions and possible answers

Forbidden questions include:

- Brexit and forthcoming general election (SP1 Leadership and SP3 Governance)
- Will my beloved Stoke get back into the Premier League or for that matter stay in the Championship (RCS2 Asset Management, OC3 Organisational Structure, SP3 Board Governance, OC2 Management, PI2 Objective / target Setting) etc etc

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Standards and guidance

What's available?

Steve Oates

Heritage Railway Association

Heritage Railway Association

RM3 Seminars November/Dcember 2019

Steve Oates, Chief Executive, Heritage Railway Association

HERITAGE RAILWAY ASSOCIATION

Guidance Notes & Standards …

Boiler Code of Practice

Standards for carriage maintenance

Infrastructure standards

Employment guidance

Governance

Operating & safety guidance

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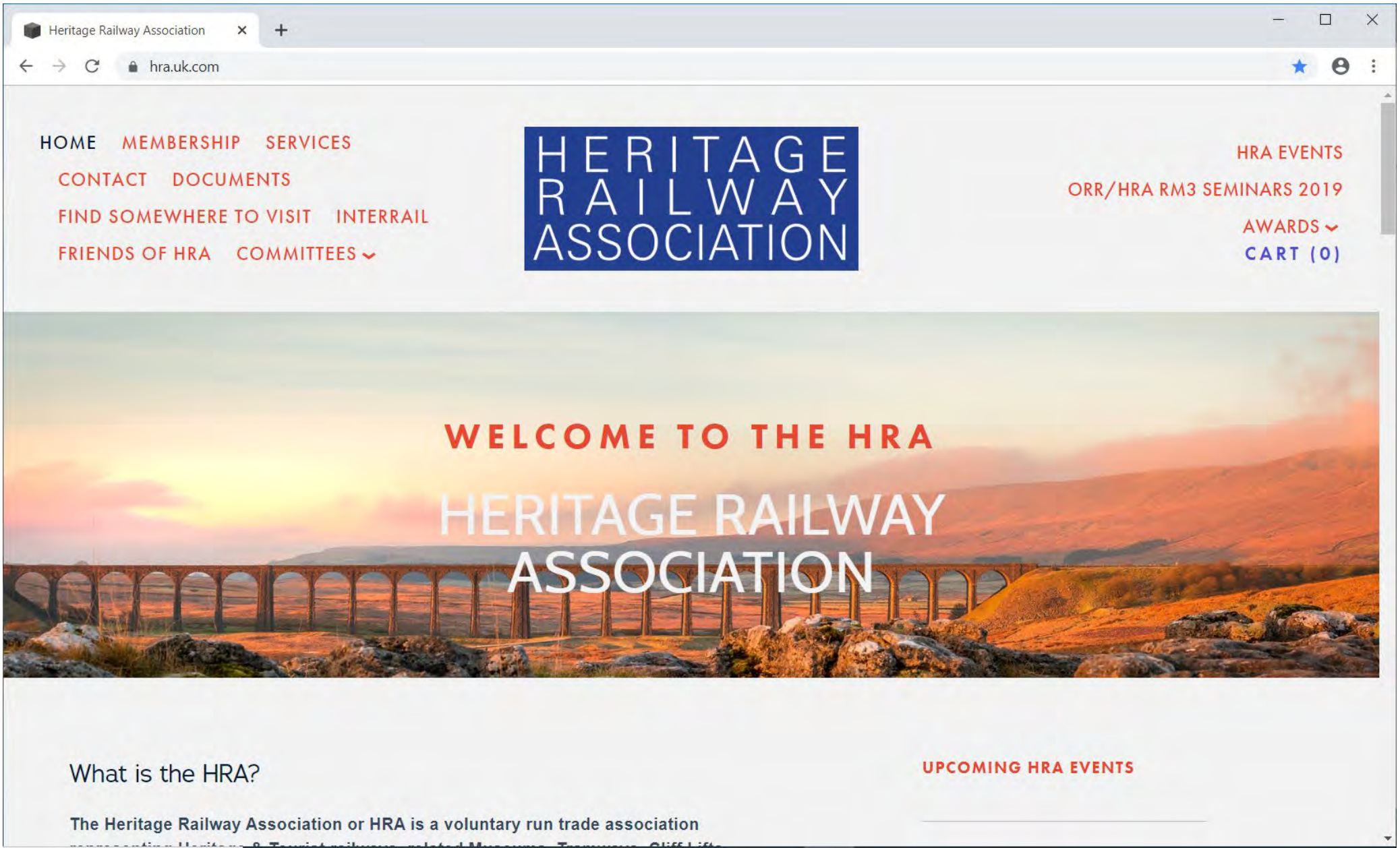
www.hra.uk.com



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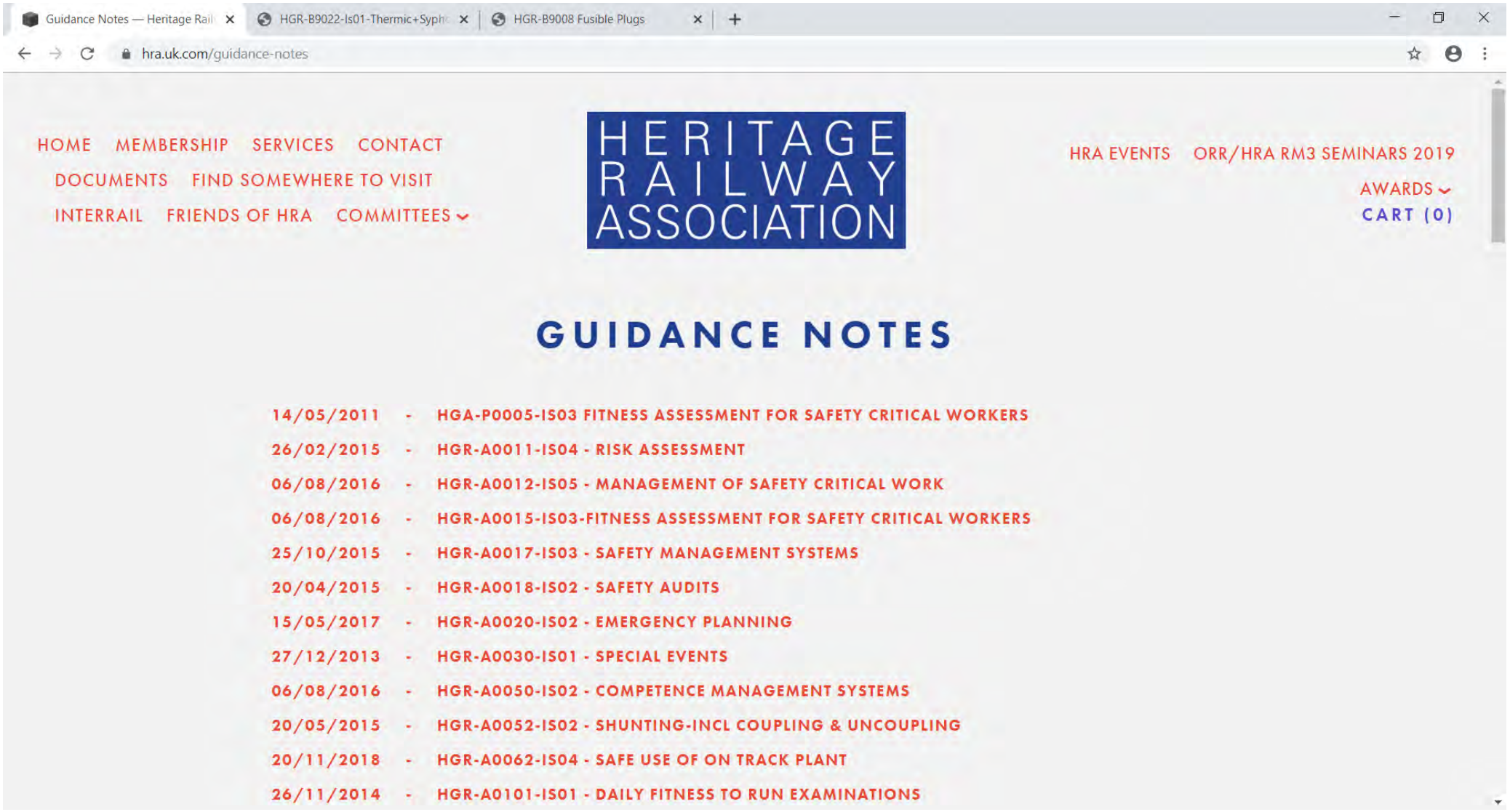

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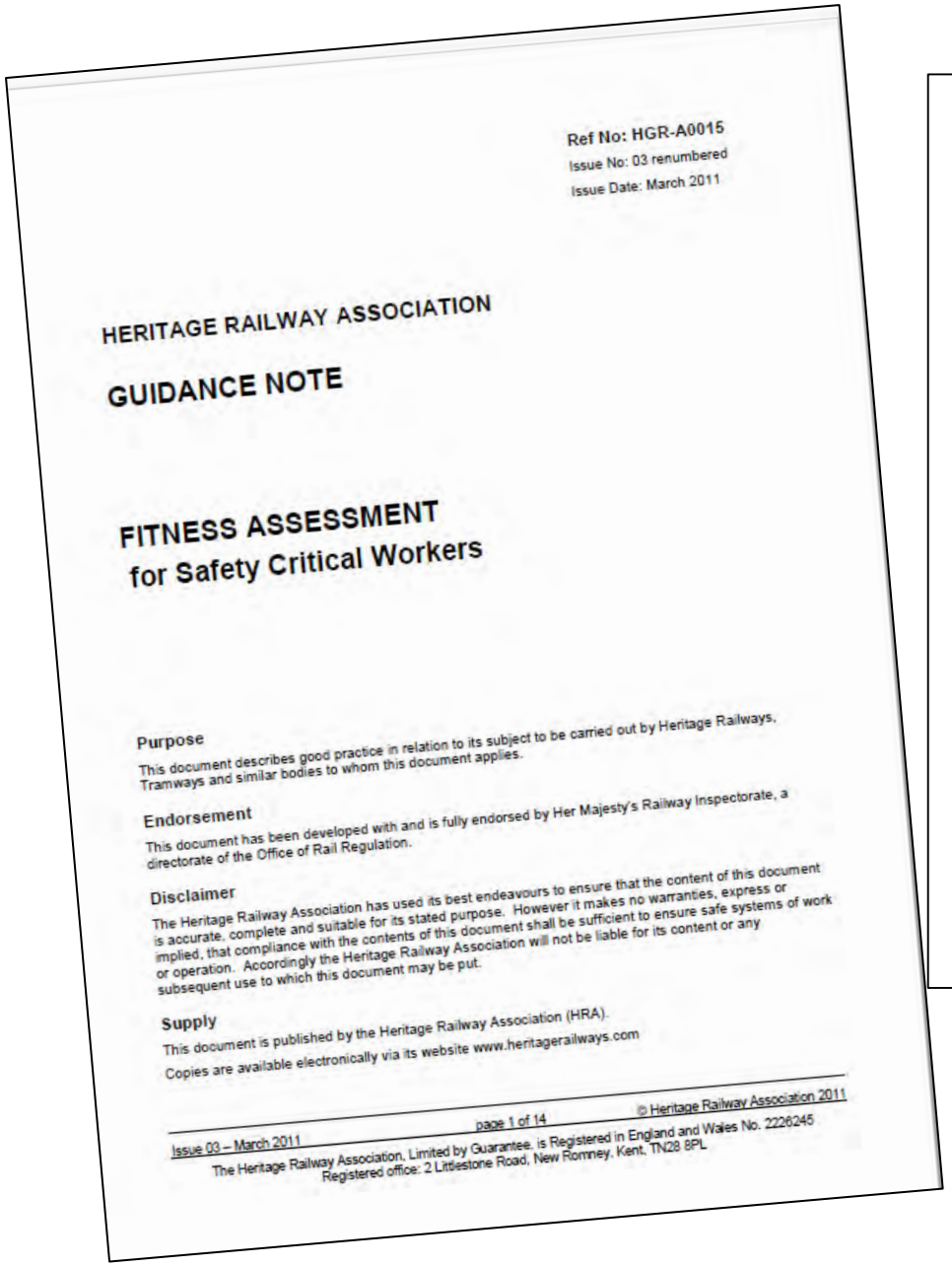

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Issue Date: March 2011

HERITAGE RAILWAY ASSOCIATION

GUIDANCE NOTE

FITNESS ASSESSMENT for Safety Critical Workers

Purpose

This document describes good practice in relation to its subject to be carried out by Heritage Railways, Tramways and similar bodies to whom this document applies.

Endorsement

This document has been developed with and is fully endorsed by Her Majesty's Railway Inspectorate, a directorate of the Office of Rail Regulation.

Disclaimer

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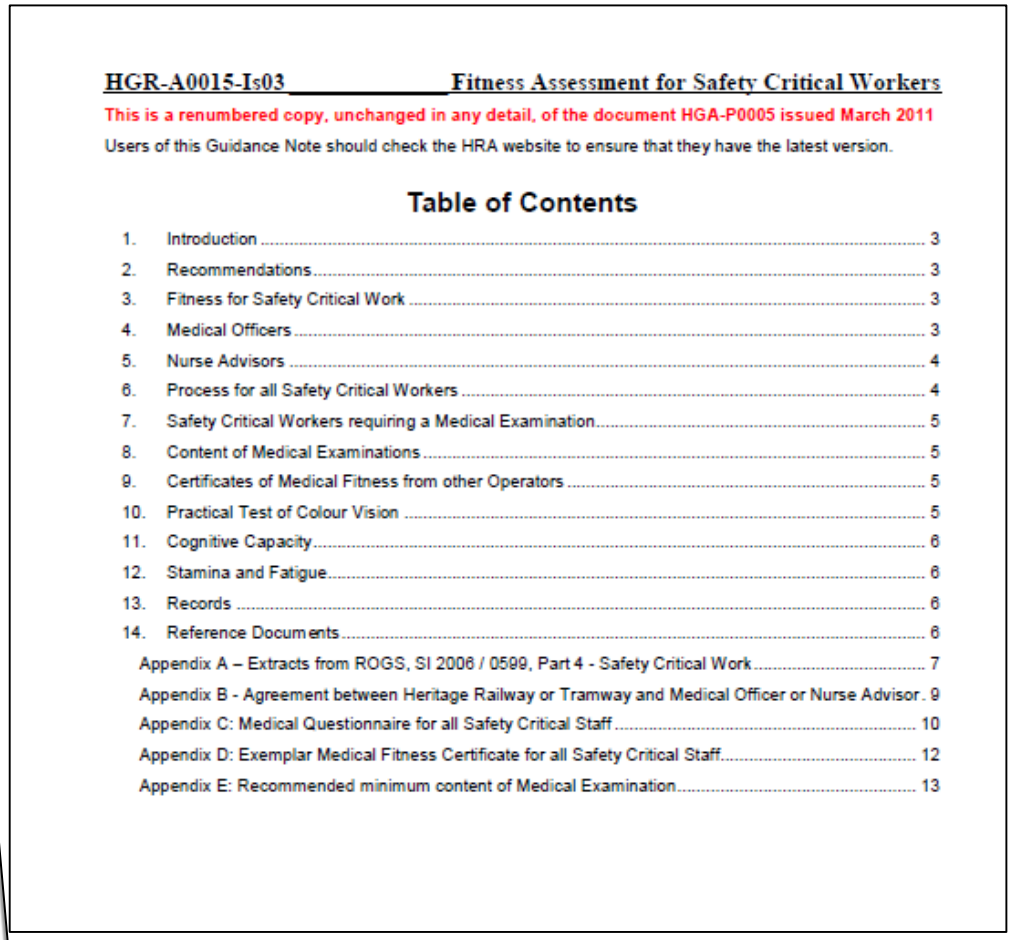

HGR-A0015-Is03 Fitness Assessment for Safety Critical Workers

This is a renumbered copy, unchanged in any detail, of the document HGA-P0005 issued March 2011

Users of this Guidance Note should check the HRA website to ensure that they have the latest version.

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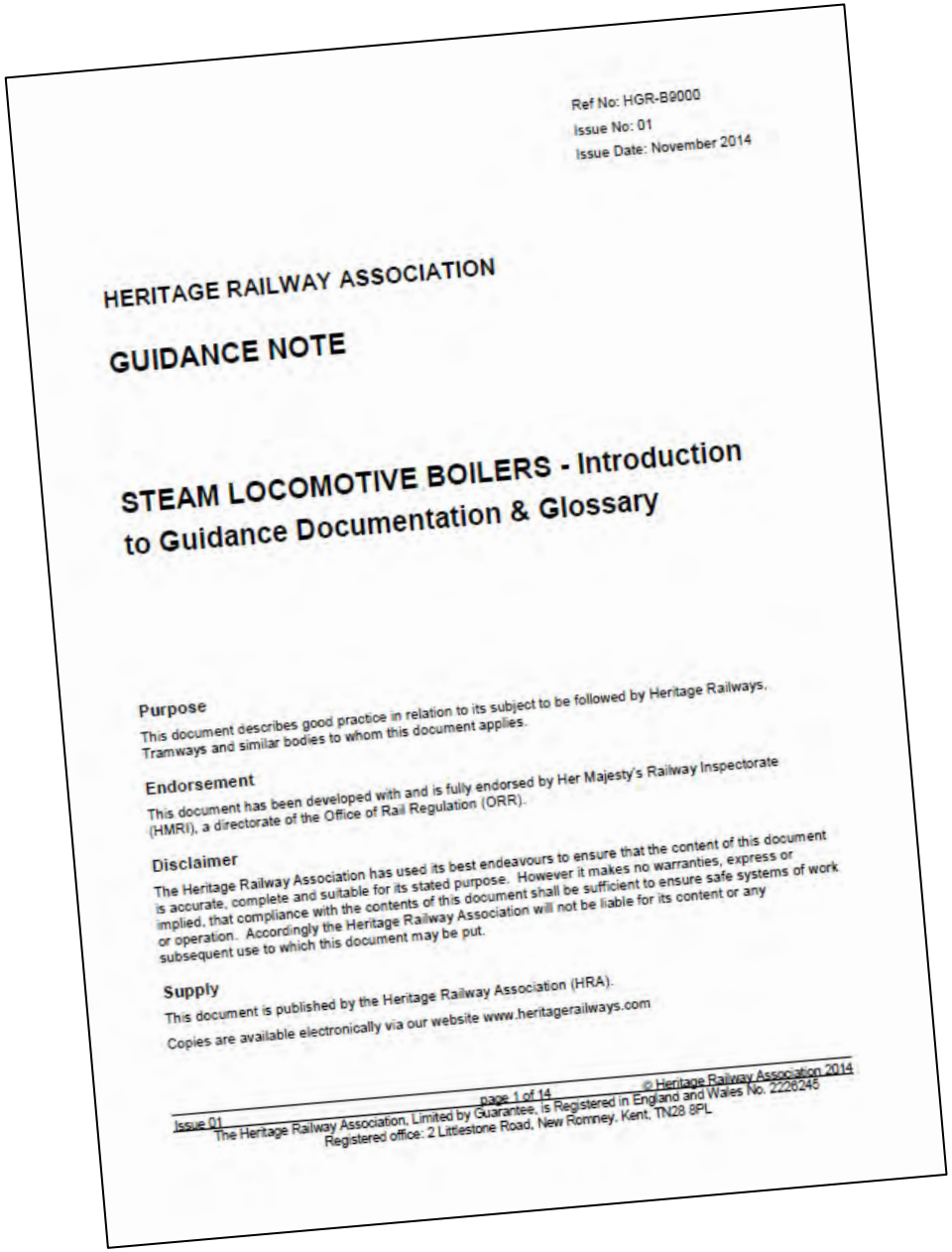
Boiler Code of Practice …



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HERITAGE RAILWAY ASSOCIATION

GUIDANCE NOTE

STEAM LOCOMOTIVE BOILERS - Introduction to Guidance Documentation & Glossary

Purpose
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TUBING OF LOCOMOTIVE BOILERS
BOILER STAYS
SUPERHEATERS
BOILER MOUNTINGS PIPEWORK & FITTINGS
FUSIBLE PLUGS
WASHOUT PLUGS
SAFETY VALVES
MUDHOLE DOORS
PLATEWORK
INNER FIREBOX REPAIR AND RENEWAL
THERMIC SYPHONS & ARCH TUBES
STEEL RIVETS & RIVETING
WELDING PROCEDURES & PROCESSES
PATCH SCREWS
SMOKEBOXES
STEAM HEATING APPARATUS
BOILER WATER TREATMENT
PREPARATION OPERATION & DISPOSAL
FROST & CORROSION PROTECTION
MATERIALS & NON-DESTRUCTIVE TESTING
WASHOUT & EXAMINATION
EXAMINATION IN SERVICE

HERITAGE RAILWAY ASSOCIATION

Reviews, revisions and updates

Input from you

Establishing new standards

Maintenance and Fitness to Run Standards for Heritage Carriages

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CCoP - Carriages Code of Practice - 11 Modules

1. Introductory Module
2. Policies and Procedures
3. Asbestos and Hazardous Materials
4. Fitness to Run Examinations
5. Facilities and Tooling Requirements
6. Bogies and wheelsets
7. Braking systems
8. Underframes and drawgear
9. Bodywork and structure
10. Ancillary systems – toilets, water, electrics
11. Wooden bodywork and structures

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Guidance Notes & Standards …

Boiler Code of Practice

Standards for carriage maintenance

Infrastructure standards

Employment guidance

Governance

Operating & safety guidance

Workshops, Seminars & Conferences

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"The guidance notes are excellent … They should be mandatory to institute"

"The HRA keep a keen eye on legislation and provides protection - this is really good"

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Heritage Rail Safety & Standards Board

- Establish a members forum for the discussion of common safety issues and the exchange of experiences
- Manage the provision, development and production of a sharable set of standards, guidance and competencies to support HRA member heritage railways
- Gather industry and safety data and statistics, and monitor and report on the sector's safety performance
- Circulate, publish and share safety information, experiences, relevant data and best practice to members
- Establish and provide a mechanism to publish urgent safety information and notices to members
- Assistance with creating and auditing SMS's

Stronger Together

HERITAGE RAILWAY ASSOCIATION

Supporting the UK's Heritage and Tourist Railways, Tramways, Museums and Related Organisations

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What more would you like?

More safety support - discuss

- The ‘going forwards’ bit (strategy)
- Future requirements
- Current gaps in support

- Working in groups,
  - have a think about what further training, information and guidance you want,
  - that you don’t get

……. how can the gap be filled?

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Summary of the day

Ian Skinner