21-009 – Rail Industry Standard for a national CCS DRACAS

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Purpose:	Approval to publish		
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Lead industry committee:	Control, Command and Signalling Standards Committee (CCS SC)	**Date:**	29 June 2023
Supporting industry committee:	Rolling Stock Standards Committee (RST SC)	**Date:**	13 July 2023
Supporting industry committee:	Traffic Operation and Management Standards Committee (TOM SC)	**Date:**	27 June 2023
Supporting industry committee:	Plant Standards Committee (PLT SC)	**Date:**	06 July 2023

Decision

CCS SC is asked to:

APPROVE the document (RIS-0707-CCS issue two) for publication

In approving the document for publication the SC has:

APPROVED with or without modification the proposed responses to comments received during consultation.

APPROVED the new issue of RIS-0707-CCS for publication.

APPROVED the withdrawal of RIS-0707-CCS issue one.

APPROVED the withdrawal of Form 8106 - Example Failure Data Collection Form issue one.

Supporting Standards Committees (RST SC, TOM SC, PLT SC) are asked to:

SUPPORT the document (RIS-0707-CCS issue two) for publication

In supporting the document(s) for publication the SC has:

SUPPORTED with or without modification the proposed responses to comments received during consultation.

SUPPORTED the new issue of RIS-0707-CCS for publication.

SUPPORTED the withdrawal of RIS-0707-CCS issue one.

APPROVED the withdrawal of Form 8106 - Example Failure Data Collection Form issue one.

21-009 – Rail Industry Standard for a national CCS DRACAS

This business case for change has been developed to support standards committees in taking decisions related to changes to standards, it includes an assessment of the predicted impacts arising from the change.

Proposed documents

Number	Title	Issue
RIS-0707-CCS	Management of Control, Command and Signalling (CCS) Subsystem Failures, Faults and Defects	2

Superseded documents

Number	Title	Issue
RIS-0707-CCS	Management of Safety Related Control, Command and Signalling System Failures	1

Documents for withdrawal

Number	Title	Issue
Form 8106	Example Failure Data Collection Form	1

Summary

Background and change

This project aims to define the processes for a national Defect Recording, Analysis and Corrective Action System (DRACAS) for shared CCS Systems; setting out the associated requirements in a proposed second issue of RIS-0707-CCS, issue one of which only has limited information on DRACAS. These support the realisation of £231M potential benefits over 10 years, as identified by the Digital Railway / Arcadis DRACAS Phase 2 (DR DPh2) report which envisages a structured national system for the management of CCS system failures, faults and defects. The creation of national processes mitigates a predicted £351M disbenefit to the industry by "doing nothing". For this Business Case, it is assumed that the implementation of the enablers for a National CCS DRACAS would support the realisation of 50% of the total benefits. As part of this project: creating a system model of the DRACAS process, a Concept of Operations and the proposed issue of the standard will support the delivery of ~35% of the total benefits as mentioned in DR DPh2 report, while the parallel project of delivering a DRACAS Road Map of implementation of the system and a further update of the standard when the National CCS DRACAS is implemented would deliver 15% of the benefits.

Systems such as the European Train Control System (ETCS) distribute accountabilities and responsibilities for managing safety and performance across a wider range of duty holders in comparison to legacy CCS systems. As such, no single duty holder is wholly accountable for the overall CCS system, its performance and reliability data. Duty holders typically focus on the parts of the system they are responsible for rather than considering the whole system. Consequently:

a. When a fault or failure occurs, there is a greater likelihood that the underlying defect or root cause is outside of the subsystem that an individual duty holder is responsible for;
b. Repeat faults and / or failures are more challenging to identify and manage; and
c. Stakeholder management and communications become increasingly complex.

The management of CCS system performance, and control of risk arising from failures, is increasingly dependent on multi-party collaboration. Future Passenger Service Contracts further incentivise this collaboration, encouraging train operators, infrastructure managers and suppliers to work together to improve performance and reliability [1].

A national CCS DRACAS supports this collaboration so that:

a. Affected duty holders can obtain the information necessary to manage their operations;
b. Duty holders can be alerted to faults or failures they are causing in another part of the system;
c. Failures, faults and defects are properly investigated to identify causes and root causes; and
d. Appropriate corrective actions are agreed, implemented and monitored.

Whilst several projects have considered a national CCS DRACAS, the processes and responsibilities have not been widely agreed or standardised. Furthermore, ETCS implementation projects have developed and implemented bespoke DRACAS processes which may not be suitable for wider application nationally. As ETCS is deployed more widely on the GB mainline railway (see Network Rail's East Coast Deployment Programme and Long-Term Deployment Plan for ETCS), the need for

[1] Williams-Shapps 'Plan for Rail': "Passenger Service Contracts will include incentives on collaboration and innovation. These will encourage operators to work closely with partners, including other operators, local teams and suppliers such as train-leasing companies to improve services and performance. For example, improvements in reliability can be unlocked by creating a focus on reducing delays that, although they may not be an operator's fault, still have a negative impact on their passengers."

the processes' requirements becomes greater. This is reiterated in a Request for Help (RfH 20-REQ-024) submitted by the DRACAS Programme Review Group (DPRG), now DRACAS Steering Group, to RSSB.

The 12-month review of RIS-0707-CCS issue one recorded that the current standard reflects "historical industry practice" and that more modern fault and failure logs contain far greater detail than was envisaged at the time issue one was written. Procedures surrounding DRACAS, and fault information for shared CCS systems like ETCS, were also absent.

To address and mitigate these issues, this two-phase project first codified the complex procedures in a 'system model' as an exemplar of a future 'National CCS DRACAS Process'. The second phase utilised this output to set out requirements for the process in a new issue of RIS-0707-CCS.

Industry impact due to changes

Impact areas	Scale of impact	Estimated value (£)
A. Legal compliance and assurance	Medium	£11.2M over ten years
B. Health, safety and security	Medium	£9.1M over ten years
C. Reliability and operational performance	Medium	£5.6M over ten years
D. Design and maintenance	High	£25.9M over ten years
E. People, process and systems	High	£29M over ten years
F. Environment and sustainability	N/A	N/A
G. Customer experience and industry reputation	Low	*£2.56M (included in C)*
Total value of industry opportunity =		**£80.8M over ten years**

The standards change contribution to the total value of industry opportunity				
☐ None or low	☐ Minor but useful	☐ Moderate	☑ Important / essential	☐ Urgent / critical

Detail

1. What were the objectives associated with this change?

PHASE 1 – MODEL THE PROCESS

Objective 1 – Set out an exemplar 'National CCS DRACAS Process'

1.1 The DRACAS will formalise a complex set of processes surrounding the collaboration and information sharing necessary to manage CCS system failures, faults and defects.

1.2 The first objective, as Phase 1 of the project, was to develop an exemplar future 'National CCS DRACAS Process' which considers the data, IT systems and people involved, focussing on the collaboration necessary to realise the data recording, analysis and corrective actions necessary to manage CCS system defects. It builds on the output of the DR DPh2 report and the pilot DRACAS being implemented by the East Coast Deployment Programme.

PHASE 2 – UPDATE THE STANDARD

Objective 2 – Set out the requirements of a 'National CCS DRACAS Process'

1.3 Existing requirements in RIS-0707-CCS issue one, are limited and focus on sharing information for failures of legacy CCS systems and only a single section references DRACAS, with little information about how it could be implemented for modern CCS systems. Furthermore, it does not specify the roles and responsibilities of duty holders, their contractors and suppliers necessary for management of shared CCS system defects consistent with realising the implementation of the future National CCS DRACAS.

1.4 By using the exemplar process from Phase 1, a set of requirements for a national CCS DRACAS have been formulated and documented in RIS-0707-CCS issue two. By doing so, duty holders are reminded of their legal responsibilities (where applicable) and are encouraged to share data that is only recorded locally at present. As highlighted by the DR DPh2 report, the greater the number of duty holders sharing information, the greater the benefits. Conversely, the fewer organisations sharing, the lower the benefits, such that returns on investments are achieved later or no returns are made at all. Furthermore, with the sharing of data between organisations, a national perspective of CCS failures, faults and defects can be ascertained, allowing easier identification of previously hidden trends and hazard precursors. Therefore, the standard specifies the information that needs to be shared, when, and why. This eases the implementation of the process on the operational railway, and the maximises the realisation of benefits.

1.5 As more information is shared, there is a need to stipulate a common language, set of definitions and ontology such that all parties can understand what others are referring to. This brings clarity to the DRACAS process and alignment with other standards related to defects, for example defining the difference between a 'fault' and 'defect' to make clear which processes should be applied.

Objective 3 – Standardise ETCS Failure Symptoms and Classifications

1.6 As highlighted in the 12-month review of RIS-0707-CCS issue one and a Request for Help (20-REQ-024), whilst failure symptoms and classification codes for legacy CCS systems like AWS and TPWS are complete, the equivalent for ETCS was undeveloped in the standard.

1.7 A nationally applicable list of ETCS failure symptoms and classification codes, including an indication of their risk level, has been developed. Standardisation provides cost and process efficiencies in the collaborative management of ETCS failures, faults and defects which can support improvements to reliability. This is also pertinent to part of recommendation 3 of the Rail Accident Investigation Branch report 17/2019 into the 'Loss of safety critical signalling data on the Cambrian Coast line' which urges "completing the documenting and categorising of safety critical ETCS failures".

Objective 4 – Review relevance of current CCS Systems' Failure Classifications

1.8 RIS-0707-CCS issue one refers to some CCS systems which are no longer used on the GB Mainline Railway, for example the National Radio Network (NRN). The relevance and importance of keeping content related to these obsolete systems has been reviewed. The failure symptoms and classifications for other CCS systems have also been reviewed.

2. How has the content in the standard changed to achieve the objectives?

PHASE 1 –MODEL THE PROCESS

Objective 1 – Set out an exemplar 'National CCS DRACAS Process'

2.1 Whilst several ETCS projects had considered a national CCS DRACAS, the processes, needs, and responsibilities had not been widely agreed. The complexity of the task and the different aims and objectives of CCS projects had meant that despite several years of consideration, there was limited understanding in the industry as to what a national CCS DRACAS would do, the benefits of having a national process and how organisations would cooperate to achieve it. A system model of the process has been developed to counter this. The model outlines the procedures and roles involved. It uses system modelling diagrams to visually represent complicated processes that can more easily be split into smaller parts which makes them easier to understand. By taking a structured approach, where discrete parts of the overall process are considered and approved sequentially, the procedures proposed are of higher quality and more readily transformed into requirements in Phase 2. The standard was not changed in Phase 1.

PHASE 2 – UPDATE THE STANDARD

Objective 2 – Set out the requirements of a 'National CCS DRACAS Process'

2.2 The content of RIS-0707-CCS issue one was limited to requirements for sharing information associated with the management of failures of shared legacy CCS systems with the only reference to 'new systems' being the requirement to use a DRACAS. Information in this section was therefore expanded to document the processes associated with a DRACAS; focussing on the need for data sharing and the opportunities surrounding a national CCS DRACAS and its associated coordination processes.

2.3 To update the standard, the set of processes and 'system model' from Phase 1 was utilised to derive a set of requirements and supporting guidance. Issue one of the standard has been substantially rewritten to introduce roles and duty holder responsibilities as well as requirements for the future National CCS DRACAS itself, and withdrawal of the example failure data collection form, RT8106. Furthermore, a new national ontology surrounding failures,

faults and defects has been created which will be adopted by other standards for example RIS-8250-RST - Reporting High Risk Defects.

Objective 3 – Standardise ETCS Failure Symptoms and Classifications

2.4 Failure symptoms and classification codes for CCS systems were in Appendix A of RIS-0707-CCS issue one. Whilst complete for systems like AWS and TWPS, Table A.5 for ETCS was blank, with a note that the information will be 'published when the symptoms and classification are available'. A new table has therefore been created in RIS-0707-CCS issue two to detail:

a) ETCS Failure Symptoms; and
b) Each symptom's 'Risk Classification' as either: Safety Related (High Risk), Safety Related (Low Risk) or Negligible Risk.

Objective 4 – Review relevance of current CCS Systems' Failure Classifications

2.5 Appendix A of RIS-0707-CCS issue one referenced CCS Systems that are no longer used on the GB Mainline Railway - the Cab Secure Radio (CSR), National Radio Network (NRN) and Interim Voice Radio System (IVRS). All tables contained within Appendix A have been reviewed for their continued relevance and applicability and removed, updated or added to as required. This includes splitting the TPWS failure symptoms table into two parts – one for 'basic TPWS' and a second for 'enhanced TPWS'.

3. How urgently did the change need to happen to achieve the objectives?

3.1 Initial deployments of modern CCS systems have started on the GB mainline railway with further schemes planned for Control Period 7 (CP7) and beyond (see Network Rail's Long-Term Deployment Plan for ETCS). Current deployments of ETCS, including the Cambrian Coast, Thameslink Core, Heathrow Tunnels, utilise local, bespoke DRACAS solutions which work effectually as there is a single infrastructure manager (IM) and railway undertaking (RU) and a limited number of suppliers. Therefore, the sharing of information is easier to undertake and the system remains small. However, the deployment of ETCS in the East Coast Deployment Programme in 2022-2024 introduces a multiple RUs, multiple suppliers operating environment, thereby requiring a more holistic, national approach. This need becomes greater as ETCS becomes more prevalent, with the national fitment of freight locomotives during CP6, and the planned deployments on the West Coast Mainline between Wigan-Warrington, the Midland Mainline between St Pancras and Bedford and Ely-Peterborough in CP7 (2024 onward).

3.2 The DR DPh2 report, endorsed by the DRACAS Project Review Group, shows that "a 'Do-Nothing' approach would further exacerbate the complexities in enabling the implementation of the Digital Railway's initiatives and incur significant safety, service unavailability and cost impact over a much longer lifecycle". Figure 1 below (taken from the report) shows that in 'doing nothing', no money is spent, therefore there is no 'cost after GDP deflation' shown in the figure, but the disbenefits for the industry accumulate to £315M over ten-years. Whilst the disbenefits lessen after year six as system reliability improves through, for example local initiatives or iterative system improvements, the industry would still be in a poorer financial position compared to today. These disbenefits were predicted to occur for at least twenty years. Without the RIS, this scenario is more likely to occur.

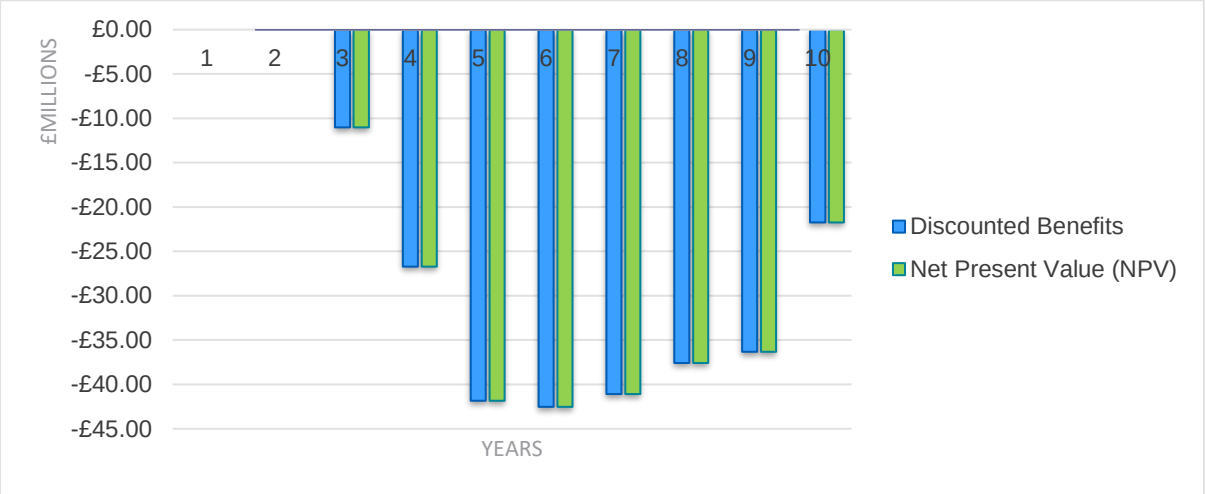

Figure 1: *"Do Nothing" approach source referenced from the Digital Railway / Arcadis DRACAS Phase 2 report. Whilst £0 cost, it is calculated that there is a £315M disbenefit to the industry over ten years with continued disbenefits occuring for at least twenty years.*

3.3 The preferred approach for a National CCS DRACAS is a blend of existing solutions and new application integration, which, whilst costly in the short-term and requiring new systems for some operators, will have a return on investment of 46% and net benefits of £231M over a

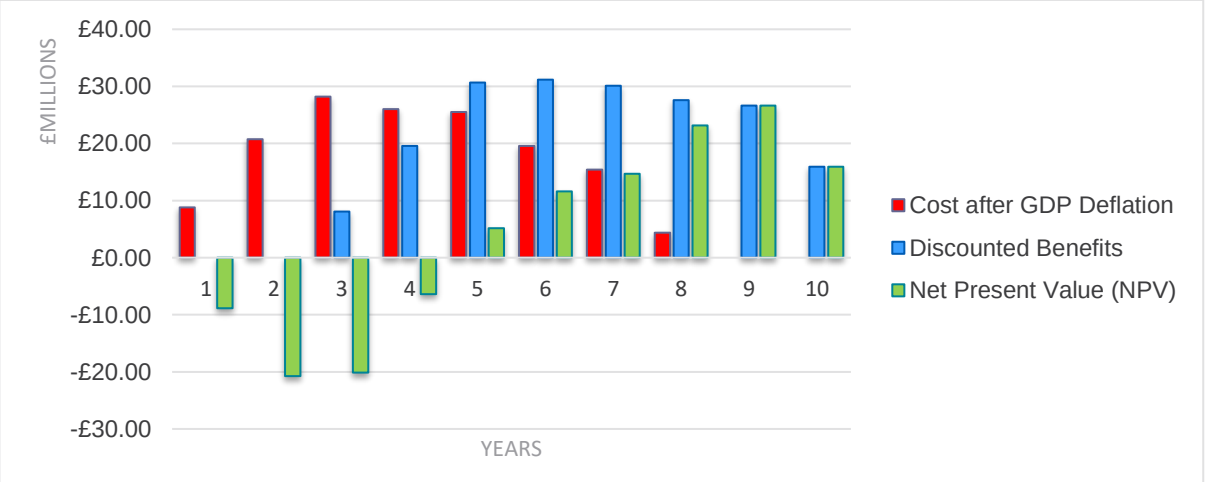

Figure 2: *Preferred approach source referenced from Digital Railway / Arcadis DRACAS Phase 2 report. Whilst having short-term costs (~£158M spread over the first eight years), benefits are estimated at £231M over the ten-year appraisal period. This equates to a benefit cost ratio of 1.46 (a 46% return on investment) with benefits realisation starting in year five.*

ten-year appraisal (figure 2). This case returns a positive Net Present Value (NPV), where benefits outweigh the costs, in year five after the initial investment.

3.4 The DR DPh2 report estimates a unique system development, which does not use existing systems as is the case in the preferred approach, would increase the cost from ~£158M to ~£342M, and eliminate most of the £231M benefits. Therefore, developing a process which accommodates the use of existing systems, standardising this through a RIS, and doing so before ETCS and local DRACAS deployments become more prevalent is directly linked to the realisation and maximisation of benefits. Furthermore, as the DR DPh2 report highlights, the return on investment is greater and achieved quicker, by having larger numbers of duty holders using a national system. By standardising the process and the data that needs to be shared, the RIS will facilitate and encourage greater use of a national system, further amplifying benefits. For this Business Case, it has been assumed that implementing the enablers for a National CCS DRACAS would support the realisation of 50% of the total benefits. As part of this project: creating a system model of the DRACAS process, a Concept of Operations and a standard will support the delivery of ~35% of the total benefits as mentioned in DR DPh2 report.

3.5 A set of DRACAS processes and the RIS itself would ideally be completed before the trial running of ETCS on multiple RU parts of the East Coast Mainline such that the systems are in place before faults and failures begin affecting the operational railway. Consequently, completing the objectives and publishing the RIS is considered is a high priority.

4. What are the positive and negative impacts of implementing the change?

Justification of impact, scale and quantification for the seven impact areas

A. Legal compliance and assurance

4.1 No single duty holder is wholly accountable for the safety or performance of modern CCS Systems like ETCS. The Railways and Other Guided Transport System (Safety) Regulations 2006 (as amended) (ROGS) includes a duty of cooperation between operators (and others, such as contractors), to make sure the railway is safe. ROGS also places obligations on duty holders to cooperate in the management of shared risk and to apply the Common Safety Methods (CSMs). Both the CSM on Risk Evaluation and Assessment (CSM RA) and CSM Monitoring are relevant in this case.

4.2 Information sharing beyond the scope of what is legally necessary supports the management of system safety and performance. By defining and standardising a national CCS DRACAS process, the information that needs to be shared, when, and with whom, becomes more apparent. The RIS reminds duty holders of their responsibilities and provides greater assurance that the industry is following the same procedures, sharing information and managing risk, as required by ROGS. The DR DPh2 report values the benefit of “centralised information sharing and collaboration to support decision making” at ~£32M over ten years – it is considered that the standard and associated documents (system model of the DRACAS process and a Concept of Operations) will support ~£11.2M of this (see 3.4).

4.3 Suppliers are important to the success of a national CCS DRACAS as they hold most of the defect information available. Conflicting business objectives, commercial sensitivities and the

applicability of RISs to suppliers means that their engagement with DRACAS may need to be facilitated through contractual arrangements. The disbenefits of this cannot be quantified at this stage.

B. Health, safety and security

4.4 By providing the means to monitor, and generate intelligence from, the number of failures and faults in CCS equipment, defects and root causes can more easily be identified. Addressing and correcting these underlying defects, means that accidents, incidents, failures and faults are less likely to occur, increasing the safety of the railway by, for example, reducing the need for staff to go on-track. Furthermore, documenting, disseminating and monitoring corrective actions increases the visibility of hazards across duty holders and clarifies accountabilities and responsibilities. Creating a system model of the DRACAS process (Objective 1 of this project) has shown what information needs to be shared and when to achieve these safety benefits. The DR DPh2 report values the benefit of "increased safety" at ~£26M over ten years – it is considered that the standard and associated documents (system model of the DRACAS process and a Concept of Operations) will support ~£9.1M of this (see 3.4).

C. Reliability and operation performance

4.5 Identifying, sharing and correcting underlying defects and root causes through a DRACAS process, means that accidents, incidents, failures and faults are less likely to occur, thereby increasing the reliability of the overall CCS system. Similarly, when faults and failures do occur, they are resolved quicker through cooperation between duty holders, guided by the DRACAS process. This can remove duplicate effort associated with different organisations investigating the same problem, unaware of the work of others – and when a solution is found, duty holders are informed more quickly. In monitoring and analysing national and localised trends, defects are more readily found, altering maintenance procedures to become more preventative rather than reactive with fewer failure events occurring as a result.

4.6 Failures of CCS systems are particularly disruptive from both the trackside and onboard perspectives – for example, trains with failed or faulty CCS equipment cannot be used in passenger service and are often stuck in depots until the equipment is fixed. Increased availability of CCS systems leads to fewer delay minutes, cancellations and short-formed services, should onboard CCS equipment be faulty. Only through cooperation and a standardised framework DRACAS process, as set out in the standard, can the benefits be realised.

4.7 The DR DPh2 report estimates £16M benefit over ten years based on:

a) "increased reliability of systems" at £7.3M over ten years;
b) "reduced variance associated with reliability engineering" at £1.5M over ten years; and
c) "increased punctuality of services" at £7.2M over ten years.

It is considered the that the standard and associated documents (system model of the DRACAS process and a Concept of Operations) will support £5.6M of this (see 3.4).

D. Design and maintenance

4.8 In monitoring and analysing national and localised trends, defects are more readily found, altering today's maintenance techniques to become more preventative rather than reactive

which results in fewer failure events occurring. However, it is only through designing a national CCS DRACAS process that this can be achieved as DRACASs to date have typically been geographically localised and have limited defect and root cause monitoring capabilities. Encouraging and assisting with the analysis of fault and failure trends through a national DRACAS, helps detect defects and root causes which can typically consist of design, manufacturing or maintenance errors that need correcting. This may lead to an altered, improved or completely new design of current and / or future CCS equipment, improving longer term system reliability.

4.9 The DR DPh2 report estimates £74M benefit based on:

a) Increased quality of equipment (£3M);
b) Reduced costs of fault tests to new CCS systems (£14.8M);
c) Reduced cost of maintenance associated with new CCS systems (£36.9M);
d) Increased visibility of supplier / batch problems (£4.5M); and
e) Increased visibility of the performance of supplier's equipment in service (£14.8M).

It is considered the that the standard and associated documents (system model of the DRACAS process and a Concept of Operations) will support £25.9M of this (see 3.4).

E. People, process and systems

4.10 Effective management of legacy CCS systems is reliant on the existing corporate knowledge and experience of failure modes, faults and defects. Existing asset management processes do not capture or record this in a way that makes it readily available to the wider industry. The Vehicle Train Control & Communications System Interface Committee (V/TC&C SIC) has identified that the existing industry processes are insufficiently robust to manage systematic failures of complex digital CCS systems such as ETCS. Furthermore, discrete ETCS deployments are creating their own set of processes and systems, ranging from structured reviews of spreadsheets to complex IT systems. Standardisation of both the processes and system functionalities avoids duplication and divergence within the industry. A national CCS DRACAS can capture emerging good practice and make it widely available, in a controlled manner, to inform the making of good decisions – the quality of the data is influenced by the actions people take and the information they enter into the system.

4.11 The DR DPh2 report estimates £83M benefit over ten years based on the following. Note the costs of altering existing systems are taken into account in Section 4. It is considered the that the standard and associated documents (system model of the DRACAS process and a Concept of Operations) will support the realisation of £29M (see 3.4) of these potential benefits:

a) More efficient use of resources (£5.9M);
b) Reduced costs (£57.5M); and
c) Increased asset knowledge (£19.6M).

F. Environment and sustainability

4.12 DRACAS and changes to RIS-0707-CCS are not directly relevant to the environment or sustainability and no benefit is claimed.

G. Customer experience and industry reputation

4.13 Standardisation, and facilitation of the National CCS DRACAS means faults and failures are more robustly tracked. Tracking leads to more rapid, efficient and effective identification of underlying defects and root causes thereby leading to fewer CCS system failures, delay minutes for failures and cancellations. For an onboard CCS failure, a train must return to the depot, and for infrastructure failures trains may not be able to run through the affected area. These failures are disruptive for customers and reducing these events would improve customer experience. The DR DPh2 report values the benefit of "increased punctuality of services" at ~£7.3M over ten years. This benefit has already been included in 4.7 above.

4.14 As CCS failures do not present themselves readily to customers, there is frustration when a train is taken out of service with, at face value, nothing wrong with it – particularly where customers are taken off a train that then departs safely. From an operational perspective, trains moving at reduced speeds is disruptive to other services and thereby other customers. Reducing these incidents improves customer experience.

4.15 By addressing defects, faults and failures, incidents and accidents are less likely to occur, enhancing the industry's safety reputation and thereby giving customers confidence.

5. What is the contribution of this standards change in realising the value to industry opportunity?

5.1 V/TC&C SIC has identified that the existing industry processes are insufficiently robust to manage systematic failures of complex digital CCS systems such as ETCS. Similarly, the DR DPh2 report states "50% of the original requirements…were deemed as being immature". Without an updated RIS and associated documents (system model of the DRACAS process and a Concept of Operations) as well as the other enablers, it was unlikely that a cohesive and consistent set of processes would be established. As the number of ETCS deployments increase, the greater number of opportunities to develop bespoke or different methods to communicate and manage failures, faults and defects arise. It therefore becomes increasingly difficult to manage information and system risk for an IM, RU or supplier.

5.2 Whilst this project does not deliver an IT system, it provides the framework for a National CCS DRACAS with oversight of whole system risk - it informs stakeholders of what is expected of them and what they can expect from the system.

5.3 Furthermore, RIS-0707-CCS issue two will support the sharing of fault and defect information. Without the RIS, the sharing of this information is likely to be piecemeal and it may be unclear what information to share, with whom, when and at what stages - the RIS brings clarity to this. It is therefore considered that an update to RIS-0707-CCS issue one is in the best interest of the GB Mainline Railway and is on the critical path to delivering a national CCS DRACAS.

5.4 The standard's contribution to the total value of industry opportunity is estimated to be £80.8M over ten years and is categorised as 'important / essential'.

6. What was the effort required by RSSB to make the change?

6.1 DRACAS encompasses a complex set of processes involving as yet undeveloped IT systems, procedures and people, each of which will need to be aligned with roles (but not specific job descriptions or positions) and duty holders. Problem statements and work related to this

subject matter have been in the industry for over ten years with the complexity of the task noted in multiple reports.

6.2 RSSB, in the first project phase, developed a system model to describe the processes, roles, responsibilities, interactions and the system boundary for the future National CCS DRACAS. This involved engagement with industry, mainly through the DRACAS Steering Group and East Coast Deployment Project (ECDP), on the proposed processes. Many stakeholders were, and are, interested and invested in the outcome of this project, which necessitated engagement with a number of different governance groups and organisations from across the industry. This phase drew on the following data sources which have relevant information to the design of a National CCS DRACAS and its implementation:

a) T754 - Development of a DRACAS for CCS equipment - customer requirements specification;
b) T957 - Costed business model for an industrywide DRACAS for shared CCS systems;
c) T960 - Specification of a DRACAS architecture and process framework;
d) Digital Railway DRACAS Phase 2 Final Report [Arcadis, 2020];
e) “Review of the National DRACAS Project” report [Nichols, 2019];
f) Digital Railway’s Client Requirements for DRACAS;
g) Network Rail’s DRACAS General Specification;
h) East Coast Deployment Project Client Requirements;
i) Western ERTMS DRACAS;
j) ‘Thameslink Core’ DRACAS; and
k) Cambrian Coast DRACAS.

6.3 The second project phase utilised the system model (above) to create a set of requirements with associated guidance in a new issue of RIS-0707-CCS. This new issue is now being prepared for consultation with industry via the established RSSB consultation processes.

6.4 To achieve these aims, RSSB assigned a Project Manager and a CCS Technical Specialist who were supported by other administrative and technical specialists as required. As part of this project, the CCS Technical Specialist utilised the DRACAS Steering Group (a sub-group of V/TC&C SIC) to assist in the drafting of the standard and its align with wider industry expectations and plans.

7. Did RSSB deliver against industry’s expected timescales?

7.1 The publication of RIS-0707-CCS issue two will enable the industry to start realising the potential benefits estimated at £231M. Although there is no industry specified timescale, this project is a high priority and RSSB will allocate the resources to achieve the earliest publication date, recognising that the delivery will be dependent on achieving industry consensus on a recognised complex matter.

7.2 The project schedule is currently resourced to meet a target publication of September 2023.

8. How will the industry implement the change?

8.1 It is expected that the standard will be adopted by IMs and RUs, primarily when new CCS Systems are deployed in their operational area.

8.2 However, suppliers and Entities in Charge of Maintenance (ECMs) are not subject to the same legislation (for example ROGS) and therefore do not have to comply with the RIS. Their involvement in the DRACAS process is critical however as they are where most, if not all, defect and root cause information comes from, particularly as increasingly fewer railway undertakings now have direct responsibility for train maintenance. The East Coast Deployment Project (ECDP) has already found resistance from some suppliers to be involved in their local DRACAS process and it is likely that similar opposition will be encountered for the National CCS DRACAS. A parallel workstream led by the RSSB's Asset Integrity Group (AIG) aims to understand suppliers' concerns and look for ways in which the amount of data sharing can be increased across multiple subject areas.

8.3 Implementation of the National DRACAS also requires the identification of an entity that owns, manages and monitors the overall system from IT and CCS perspectives. The latter enables the identification of hidden defect trends and hazard precursors using whole-industry data. This project has codified what the responsibilities of the entity are and what it needs to do, identifying what would be expected from a new or existing organisation in taking on this role. Equally, the standard is predicated on the existence of this entity and without it, the full benefits are unlikely to be realised.

8.4 How local DRACAS systems will integrate with a national system is unknown and may be expensive for some duty holders where existing systems are altered. Requirements of the National CCS DRACAS Process will seek to minimise double entry of information as much as possible. However, if an existing system cannot submit or receive information directly from a national layer, additional work is introduced, with a potential decrease in the quality of information. Work being undertaken by AIG on Data Sharing intends to establish the location of current information and its accessibility, thereby identifying the barriers to the integration of systems. The 'system model' and standard, however, are system agnostic and could utilise an already existing industry system, should it be able to meet the new requirements in RIS-0707-CCS issue two.

9. How will RSSB assess whether the change is achieving the objectives?

9.1 Effectiveness of the standard will be monitored through the DRACAS Steering Group and the near-term ETCS deployment projects, such as the East Coast Deployment Programme. Existing ETCS DRACAS users, like those running on the Western Route, should recognise the processes set out in the standard and can provide on-going feedback as required through existing channels, such as the DRACAS Steering Group.

9.2 Without the National Coordinator entity and associated people and IT surrounding that, it will be challenging to assess the effectiveness of the standard as only limited means would be available to achieve the benefits set out in Section 4, for example automated data sharing and minimising system risk.

Appendix A: Disposition Table

Table A1: RIS-0707-CCS issue one to RIS-0707-CCS issue two

From RIS-0707-CCS issue one	To RIS-0707-CCS issue two	Way forward	Comments	Objective
Part 1 Introduction	Part 1 Purpose and Introduction	Redrafted	New RSSB style	2
1.1 Purpose of this document	1.1 Purpose	Redrafted	New RSSB style	2
1.1.1	Synopsis	Revised	Updated wording added to synopsis	2
1.2 Background	N/A	Withdrawn	Incorporated into Purpose	2
1.2.1	1.1.1	Revised	Wording updated to remove reference to GERT8106 and reflect new content in the issue two of the standard	2
1.2.2	Issue record	Redrafted	Summary added to issue record	2
1.2.3	Issue record	Redrafted	Redrafted text partially incorporated into issue record. Annex A is no longer included and is now in the main part of the document	2
1.3 Application of this document	1.2 Application of this document	No change	N/A	2
1.3.1	N/A	Withdrawn	No longer applicable	2
1.3.2	1.2.1	Redrafted	Removed “therefore”	2
1.3.3	1.2.2	Revised	Changed to reflect current RSSB processes	2
1.4 Health and safety responsibilities	1.3 Health and safety responsibilities	No change	N/A	2
1.4.1	1.3.1	No change	N/A	2
1.5 The structure of this document	1.4 Structure of this document	Redrafted	“The” removed	2
1.5.1	1.4.1	Revised	Previous text no longer applicable.	2

From RIS-0707-CCS issue one	To RIS-0707-CCS issue two	Way forward	Comments	Objective
1.6 Approval and authorisation of this document	1.5 Approval and authorisation of this document	No change	N/A	2
1.6.1	1.5.1	Redrafted	Issue dates updated	2
1.6.2	1.5.2	Redrafted	Issue dates updated	2
Annex A. Text of GERT8106 Management of Safety Related Control, Command and Signalling System Failures, issue two	N/A	Withdrawn	Title not applicable in issue two – the requirements in the Annex have been incorporated into the main standard	2
Part 1 Purpose and Introduction	Part 1 Purpose and Introduction	No change	N/A	2
1.1 Purpose	1.1 Purpose	No change	N/A	2
1.1.1	1.1.1	Redrafted	Wording changed but meaning remains	2
1.1.2	2.1	Revised	Guidance has been expanded and updated to reflect the information contained within the RSSB Concept of Operations for the National CCS DRACAS.	2
1.2 Introduction	N/A	Withdrawn	Not applicable in issue two	2
1.2.1 Background	N/A	Withdrawn	Not applicable in issue two	2
1.2.1.1	1.1.5	Redrafted	Wording clarified and made more succinct	2
1.2.1.2	1.1.2	Redrafted	Wording changed so statements consider what is excluded from scope rather than included	2
1.2.1.3	G 2.1.3	Redrafted	Guidance has been expanded and updated to reflect the information contained within the RSSB Concept of Operations for the National CCS DRACAS.	2
1.2.1.4	N/A	Withdrawn	Guidance no longer required as the requirement itself lists what needs to be shared between organisations	2

From RIS-0707-CCS issue one	To RIS-0707-CCS issue two	Way forward	Comments	Objective
1.2.1.5	G 4.8.22	Redrafted	Relationship to related standards and reporting systems moved into guidance in the body of the standard	2
1.2.1.6	G 4.8.22	Redrafted	Relationship to related standards and reporting systems moved into guidance in the body of the standard	2
1.2.1.7	G 4.8.22	Redrafted	Relationship to related standards and reporting systems moved into guidance in the body of the standard	2
1.2.1.8	G 4.8.22	Redrafted	Relationship to related standards and reporting systems moved into guidance in the body of the standard	2
1.2.2 Principles	Principles	No change	N/A	2
1.2.2.1	1.1.9	Redrafted	Wording is spread over several principles in 1.1.9 in issue two.	2
1.2.2.2	N/A	Withdrawn	Assumption and repeats other standards	2
1.2.2.3	N/A	Withdrawn	Assumption and repeats other standards	2
1.2.2.4	N/A	Withdrawn	Assumption and no longer required.	2
1.2.2.5	1.1.6	Revised	Original principle split into two sections. Partially duplicated by integrity requirement (4.10.1) – this part has therefore been removed. The remaining principle has been redrafted into guidance in 1.1.6.	2
1.2.2.6	1.1.7	Redrafted	Wording changed to suit guidance style; original meaning remains	2
1.2.2.7	N/A	Withdrawn	Appendix C has been withdrawn. The interactions between organisations are included in RSSB Concept of Operations for the National CCS DRACAS , as referenced in the standard.	2
1.2.2.8	1.1.9 c)	Redrafted	Wording changed to match the new list of principles in issue two.	2
1.2.3 Related requirements in other documents	References	Redrafted	Incorporated into references section	2
1.2.3.1	References	Redrafted	Incorporated into references section	2

From RIS-0707-CCS issue one	To RIS-0707-CCS issue two	Way forward	Comments	Objective
2.1 Classification of CCS system failures	4.2 CCS subsystem failures: Risk classification	Redrafted	Reworded to match issue two style	2
2.1.1 Classifying reported failures	N/A	Withdrawn	Superfluous title	2
2.1.1.1	4.2.1 4.5.3	Revised	Principle requirement redrafted, with the original meaning retained. 2.1.1.1 a) and b) incorporated into 4.5.3 with redrafted wording.	2
2.1.1.2	G 4.2.12	Converted to guidance	Original requirement now partly overlaps with 4.2.1. Specific wording has moved into guidance to align with other good practice on sharing risk classifications.	2
2.1.1.3	4.2.2	Redrafted	Redrafted to be more succinct	2
2.1.1.4	4.2.2 G 4.2.14	Redrafted Converted to guidance	Redrafted to be more succinct. Submitting a proposal for new classifications converted into guidance.	2
2.1.1.5	G 4.2.14	Converted to guidance	Request for Help process now included as guidance rather than requirement. Wording updated to reflect current RSSB processes after changes to the Railway Standards Code.	2
2.1.2 Updating failure classifications as a result of failure investigation	N/A	Withdrawn	Superfluous title	2
2.1.2.1	4.2.3	Redrafted	Wording updated to align with other terms used in issue two.	2
2.1.2.2	4.5.3	Redrafted	Wording updated to align with other terms used in issue two.	2
2.2 Communication of information about CCS system failures	N/A	Withdrawn	Superfluous title	2
2.2.1 Requirements for communication systems	4.7 CCS subsystem failures: Reporting facility	Redrafted	Wording updated to align with other terms used in issue two.	2

From RIS-0707-CCS issue one	To RIS-0707-CCS issue two	Way forward	Comments	Objective
2.2.1.1	4.7.1	Revised	Requirement revised to only have a reporting facility being available when a CCS subsystem is being operated, rather than available 24 hours a day. Failure can only occur when the system is operation. This requirement will be less onerous on very small operators.	2
2.2.1.2	G 4.7.11	Converted to guidance	Guidance expanded to include different types of media and which methods are preferable. Sharing the details of the preferred reporting facility with other organisations has also been included in this guidance.	2
2.2.1.3	4.7.3	Redrafted	Redrafted to be more succinct	2
2.2.1.4	4.7.2 G 4.7.11	Redrafted Converted to guidance	The requirement to be able to send and receive information remains. Media format examples have been moved to guidance.	2
2.2.1.5 a)	4.1.3	Revised	Wording revised to include roles, responsibilities and tasks being included in documented procedures. Removed “ensure that”.	2
2.2.1.5 b)	G 4.8.16	Converted to guidance	Revised to “monitoring the consistency of process implementation” rather than ensuring that requirements are followed correctly. Removed “ensure that”.	2
2.2.1.5 c)	G 4.8.14	Converted to guidance	Previous requirement had multiple elements about “ensuring data is transmitted correctly” and “at the earliest opportunity”. Data transmission was already covered by another requirement; sharing data promptly has moved to guidance.	2
2.2.1.6 a) and b)	4.7.2	Revised	References to electronic databases removed from requirement	2
2.2.1.6 c)	4.9.1 a)	Redrafted	Redrafted to be more succinct	2
2.2.1.7	4.10.1	Revised	Data integrity checks replace this requirement to be more specific on how data can be confirmed to be complete and, where practical, correct and accurate. Additional guidance has also been provided in this section.	2
2.2.1.8	4.9.1	Revised	Requirement revised to be more specific, and has additional requirements (e.g. error logs) and guidance to assist.	2
2.2.2 Identification of safety related failures	4.3 CCS subsystem failures: Identification	Redrafted	Wording updated to align with other terms used in issue two.	2
2.2.2.1	4.3.1	Redrafted	Rationale removed from requirement	2

From RIS-0707-CCS issue one	To RIS-0707-CCS issue two	Way forward	Comments	Objective
2.2.2.2	N/A	Withdrawn	Requirement withdrawn as there is no rationale to share this information. It does not impact on the capability of the organisation receiving the information. The traceability of failure identifiers is covered by 4.8.1 and 4.8.2.	2
2.2.2.3	G 4.1.13	Converted to guidance	Recording failures during maintenance and testing converted to guidance and highlighted as good practice. Assigning a failure identifier to this duplicates other requirements.	2
2.2.2.4	4.8.2	Redrafted	Wording updated to align with other terms used in issue two.	2
2.2.2.5	G 4.3.2 G 4.8.18	Converted to guidance	Not a requirement. Converted to rationale (G 4.3.2) and expanded guidance (G 4.8.18) with “ensure that” removed.	2
2.2.3 Communicating information about safety related failures	4.8 CCS subsystem failures: Information and data sharing	Redrafted	Wording updated to align with other terms used in issue two.	2
2.2.3.1	4.8.1 G 4.8.14	Revised Converted to guidance	Requirement split with the new requirement maintaining the need to share information, with ‘earliest opportunity’ redrafted and moved to guidance (G 4.8.14)	2
2.2.3.2	G 4.8.20	Converted to guidance	Partially duplicated by new requirement, hence moved to guidance. Sharing investigation duration only mentioned in guidance.	2
2.2.3.3	4.5.1	Revised	References to initial failure investigations removed. Timescales for sharing removed.	2
2.2.3.4	N/A	Withdrawn	Appendix B has been removed with information now in the RSSB Concept of Operations for the National CCS DRACAS. RT8106 has also been withdrawn, therefore the guidance is no longer applicable.	2
2.2.3.5	4.4.1	Revised	List of data to share has been updated to match the RSSB Concept of Operations for a National CCS DRACAS. Railway Undertaking and Infrastructure Manager lists combined. Description of each data element moved into guidance.	2
2.2.3.6	4.4.1	Revised	List of data to share has been updated to match the RSSB Concept of Operations for a National CCS DRACAS. Railway Undertaking and Infrastructure Manager lists combined. Description of each data element moved into guidance.	2
2.2.3.7	4.8.1	Redrafted	Combined with another requirement where information is “shared” and “kept up to date”.	2

From RIS-0707-CCS issue one	To RIS-0707-CCS issue two	Way forward	Comments	Objective
2.2.4 Management of CCS system failures where the failure investigations conducted by the railway undertaking(s) and infrastructure manager have not identified a fault with either the infrastructure or trainborne sub-systems	N/A	Withdrawn	Superfluous title	2
2.2.4.1	4.5.3 G 4.5.8	Revised Converted to guidance	Requirement simplified and split. Changing the risk classification when it is established that the event is not a failure of the CCS subsystem remains a requirement (4.5.3). Jointly deciding the appropriate course of action has been converted to guidance (G 4.5.8).	2
2.3 Failure management requirements for new CCS systems	N/A	Withdrawn	Superfluous title	2
2.3.1 Requirements for DRACAS	N/A	Withdrawn	Superfluous title	2
2.3.1.1	4.1.2	Revised	Clarified “new CCS systems”. Meaning changed to not require a new, separate DRACAS for every project, rather, a DRACAS is used and need not be a new one. This aligns with the intent of a future National CCS DRACAS.	2
2.3.1.2 a)	4.7.2	Revised	Requirement duplicates another; incorporated into 4.7.2. Guidance added to note that when the National CCS DRACAS is implemented, the local system will need to share information with other DRACAS.	2
2.3.1.2 b)	G 4.6.8 e)	Converted to guidance	Specific example of ‘predicted vs actual reliability’ moved to guidance. Requirement to monitor trend in failures, fault and defects remains (4.6.1).	2

From RIS-0707-CCS issue one	To RIS-0707-CCS issue two	Way forward	Comments	Objective
2.3.1.2 c)	N/A	Withdrawn	Not a requirement, and just an example of a possible Key Performance Indicator. Additional guidance, and references to external standards, in section 4.6 (issue two) has replaced this.	2
2.3.1.2 d)	4.6.1	Revised	Requirement incorporated into a broader requirement around monitoring trends in failures, fault and defects (4.6.1)	2
2.3.1.2 e)	N/A	Withdrawn	No longer required – identifying whether the cause is technical or operational is now part of the DRACAS with new guidance in section 2.2 (Reporting Unwanted Events to the National CCS DRACAS) showing how human factors can be incorporated into technical investigations.	2
2.3.1.2 f)	N/A	Withdrawn	No longer required – identifying whether the onboard or trackside subsystem is at fault is part of the investigation process to understand responsibility, and whether there are underlying defects within a subsystem.	2
2.3.1.2 g)	N/A	Withdrawn	Not a requirement. Incorporated into rationale and guidance throughout issue two of the RIS.	2
Appendix A. Classification of failures of control, command and signalling (CCS) systems that include a trainborne sub-system	Appendix A Risk classifications for CCS subsystem failures	Redrafted	Rewording to match the rest of the standard	4
A.1 A.1 Classification scheme	4.2 CCS subsystem failures: Risk classification	Redrafted	Requirement moved out of Appendix	4
A.1.1	4.2.1 G 4.2.10	Redrafted	Requirement moved out of Appendix and redrafted to require operators to use Appendix A. List of risk classifications moved to G 4.2.10.	4
A.1.2	A.1.1	Redrafted	Table list updated. Introductory text has additional guidance added	4
A.1 Automatic Warning System (AWS) failures	A.2 Automatic Warning System (AWS)	Revised	Table format updated. Any code 3 failures are classified as ‘high risk’, rather than in issue one where a transient failure could be classified as negligible risk. This is not aligned with reporting all failure to the National CCS DRACAS. Additional symptom added for AWS circuit breaker.	4

From RIS-0707-CCS issue one	To RIS-0707-CCS issue two	Way forward	Comments	Objective
A.2 Train Protection and Warning System (TPWS) failures	A.3 Train Protection and Warning System (TPWS)	Revised / New	TPWS failure symptoms updated and expanded to include enhanced TPWS with 'upgraded' onboard which includes a new DMI and audible announcements. Text for code 16 and 17 failures altered. References to "GERT8075, AWS and TPWS Interface Requirements, and RIS-0775-CCS, AWS and TPWS Application Requirements" now specifically stated.	4
A.3 Great Western and Chiltern Automatic Train Protection System (ATP) failures	A.4 Great Western Automatic Train Protection System (GW-ATP)	Revised	Table format updated and references to Chiltern ATP removed as the system is no longer in use.	4
N/A	A.5 Contrôle de Vitesse par Balises (KVB)	New	New, blank table added to the standard to incorporate the failure symptoms of KVB.	4
A.4 TVM430 Cab Signalling System failures	A.6 TVM430 Cab Signalling System	Redrafted	Table format updated	4
A.5 European Train Control System (ETCS) failures	A.7 European Train Control System (ETCS)	New	Table A.5 in issue one was blank – all content added to this section is new.	3
A.6 Mechanical train stop failures	A.8 Mechanical train-stop system	Revised	Table format updated. All failures of the train-stop function, whether reported to the signaller or not, are classified as high risk. Reference to GERT8018 Mechanical Trainstop System Interface now specifically made.	4
A.7 Train detection system failures	A.9 Infrastructure-based train detection system	Redrafted	Table format updated	4
A.8 Cab Secure Radio (CSR) failures	N/A	Withdrawn	System no longer in use on the GB Mainline Railway	4
A.9 National Radio Network (NRN) failures	N/A	Withdrawn	System no longer in use on the GB Mainline Railway	4

From RIS-0707-CCS issue one	To RIS-0707-CCS issue two	Way forward	Comments	Objective
A.10 Radio Electronic Token Block (RETB) failures	A.10 Radio Electronic Token Block (RETB)	Redrafted	Table format updated	4
A.11 Interim Vehicle Radio System (IVRS) failures	N/A	Withdrawn	System no longer in use on the GB Mainline Railway	4
A.12 Global System Mobile – Railway (GSM-R) failures	A.11 Global System for Mobile Communications - Railway (GSM-R)	Redrafted	Table format updated	4
A.13 Tilt Authorisation and Supervision System (TASS) failures	A.12 Tilt Authorisation and Supervision System (TASS)	Redrafted	Table format updated. “Where required” changed to “when required” in 3 failure symptoms. Reference to RIS-8019-CCS, Tilting Trains: Controlling Tilt Systems to Maintain Clearances now specifically made.	4
N/A	A.13 Communication-Based Train Control (CBTC)	New	New, blank table added to the standard to incorporate the failure symptoms of CBTC.	4
Appendix B1 Flowchart for a typical CCS failure investigation	N/A	Withdrawn	Diagrams with more detailed sequence diagrams developed as part of the RSSB System Model for a National CCS DRACAS are available in separate reports. The sequence diagrams are also included in the RSSB Concept of Operations for the National CCS DRACAS. Appendix B has been withdrawn as a result.	2
Appendix B2 Flowchart for a typical CCS failure review	Figure 1	Revised	Updated diagram from the RSSB Concept of Operations now included in the main body of the standard in section 2.1 rather than as an appendix.	2
Appendix C. Typical interactions and communication links	N/A	Withdrawn	No longer applicable and replaced by guidance elsewhere in issue two of the standard and the RSSB Concept of Operations for the National CCS DRACAS.	2

From RIS-0707-CCS issue one	To RIS-0707-CCS issue two	Way forward	Comments	Objective
RT8106 - Example failure data collection form	N/A	Withdrawn	Form will be replaced by a National CCS DRACAS form (likely online) once the system is implemented. Requirements have changed on what data fields to record, see 4.4.1. Guidance is also provided on the data fields in G 4.4.4. The form only provides an example, rather than showing something to be adopted by organisations. Operational roles already have the mandatory form RT3185 to report signalling failures and irregularities, which has greater granularity.	2
N/A	Part 3 (all requirements)	New	New section for requirements on the future National CCS DRACAS. They apply to the system itself rather than to duty holders.	2
N/A	4.1.1	New	New requirement to use a failure management system or DRACAS for all accidents, incidents and failures that implicate a CCS subsystem. This is an expansion on issue one which only considered CCS failures. Partially replaces 2.3.1.2 in issue one. New requirement is more specific.	2
N/A	4.5.2	New	New requirement added to specifically state what information should be shared where it is concluded a CCS subsystem failure has occurred. This includes wording such as ‘containment actions’ and ‘corrective actions’ which were not included in issue one.	2
N/A	4.10.2	New	Data cybersecurity requirement introduced with guidance on relevant legislation and external standards. This supports the safe and secure sharing of data and helps prepare for the implementation of the National CCS DRACAS.	2