Rijkswaterstaat
Ministerie van Infrastructuur en Milieu

Common Highways Agency Rijkswaterstaat Model (CHARM)

Highways Agency As-Is Application Descriptions and Requirements

Version: 2.1

Document control

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Mark Austin	Team Leader for Architecture and Technology within CHARM

Approvals

Name	Signature	Title	Date of Issue	Version
Mark Austin		Team Leader for Architecture and Technology within CHARM	9/12/14	1.1

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Contents

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Management Summary

This document provides a description of the As-Is application and infrastructure landscape as expected at the end of 2015 within Regional Control Centres (RCCs) and National Traffic Operations Centre (NTOC) managed by the Highways Agency. Thus they describe the context in which CHARM will first be deployed.

A separate document has been produced for the Rijkswaterstaat [Ref 5]

The As-Is Application Landscape Model (reference 1) provides a number of views showing the As-Is applications and the technical infrastructure. The key views have been embedded as .png images in this document. Systems to be replaced by CHARM are shown in blue. Other systems or components are shown in green.

There is an expectation that all of the key existing RCC and NTOC systems functions will be replaced by the CHARM systems but that all of the existing interfaces, including those for roadside devices must be maintained. In addition there are some functions, usually related to safety that must also be maintained. For example the NMCS2 signals will have to be polled by CHARM as they currently are by HATMS, and the operation of the Tidal Flow area in Birmingham will remain the same.

The Interface Requirements Specification (reference 2) describes each of the interfaces that CHARM will have to support. This document describes, for each As-Is component, the requirements that CHARM will have to meet in order to sustain existing functionality.

In total 42 current subsystems and applications will be impacted by the introduction of CHARM. A number of groups of manual processes have also been identified as being impacted by CHARM.

There are a small number of in-flight projects that are expected to affect systems within the scope of CHARM within the next few years and that may not be complete by the end of 2015.

The 2015 As-Is In scope applications have:

a) 15 interfaces to roadside systems and devices;
b) 9 interfaces to systems of (traffic centre) information providers or users; and
c) 5 interfaces to internal systems.

All the interfaces are generally well documented and a list of the specifications for each interface is included in reference 2, and as appropriate for requirements identified in this document.

The full reference documentation can be found on the Highways Agency Plans registry web site.

https://tssplansregistry.dft.gov.uk/homepage.asp

1. Introduction

1.1 Identification

This document provides the description of the HA As-Is landscape that is part of the Invitation To Participate in Dialogue (ITPD) document set.

1.2 Aim of the Document

The aim of the document is to describe the environment within the Highways Agency into which CHARM must be deployed and to identify functions performed by the current systems that must be provided by their replacement. These functions have been defined as requirements on CHARM.

A separate document provides an equivalent view for Rijkswaterstaat systems [Ref 5].

1.3 Approach

A key assumption is that CHARM will replace RCC and NTOC systems in their entirety. Apart from a small number of projects that affect interfacing systems the HA application landscape is mature.

Archimate was used to produce a model of the existing RCC and NTOC systems. This was then reviewed by selected stakeholders within the HA to improve its accuracy.

The latest version of this model can be found as reference 1. The most important view is the As-Is Application view of which a .png graphics file is embedded here:

As_Is_Application.png

Figure 1 - As-Is Applications (reference 1)

The colours are defined as follows with the darker shades only being used for readability within components.

To be replaced by CHARM		
Interfacing to CHARM but out of scope		
Interfaces		

A number of views modelling the infrastructure have been produced. These are explained later in the document.

Having reviewed the models, each of the As-Is components were considered. Because these components are all being replaced by CHARM rather than subsumed or re-used, a set of requirements have been produced defining only those functions which CHARM will have to meet.

The As-Is Application view identifies a number of functions currently performed manually.

A separate document (reference 2) describes each interface within the Highways Agency environment that will have to be supported by CHARM.

A short section on in-flight projects has also been included to document their impact on CHARM.

1.4 Structure

The document is structured as follows:

- Section 1 Introduction – explains the purpose of the document and its production.
- Section 2 Business Context – depicts the organisations that interact with the RCCs and NTOC in managing traffic on the SRN.
- Section 3 Application Components – describes each As-Is component in scope of CHARM and identifies any requirements to be met by CHARM.
- Section 4 Manual Functions – Briefly describes the manual functions supported by the As-Is systems.
- Section 5 Inflight Projects – Identifies any in-flight projects that may impact on CHARM, and the likely implications.
- Section 6 - Physical Infrastructure – diagrams illustrate the physical relationship of the various interfaces and infrastructure services.
- Section 7 References – Referenced documents and abbreviations used in this document.

2. Business Context

The Traffic Management Centres (TMCs), both RCCs and NTOC, are at the centre of the Highways Agency's traffic operations on the Strategic Road Network (SRB). Figure 2 illustrates the range and type of the organisations and groups that the TMCs interact with on a daily basis.

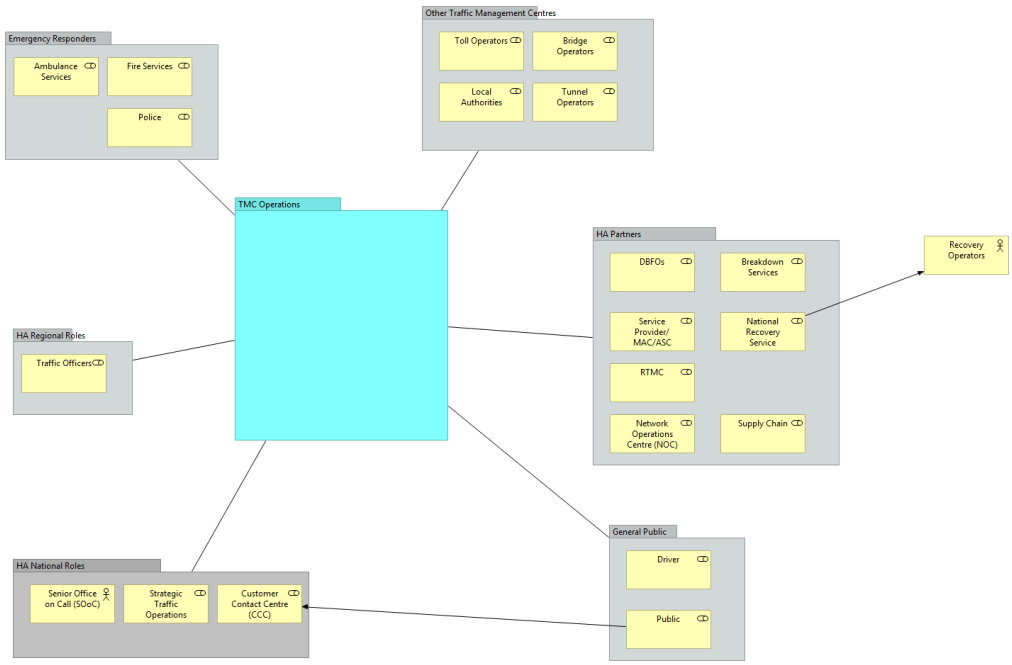

Figure 2 - Business Context

In addition to the interactions shown, TMCs also draw information on weather, system faults, abnormal loads and winter maintenance, generally through Internet web pages.

3. Application Components

It should be noted that, unlike RWS, the HA intend to replace all of the systems/applications. These are marked as in-scope of CHARM on the As-Is Application model.

On the As-Is model (ref. 1), as shown in the drawing included in section 1.2 above, components and functions that are in scope are coloured blue. Where an in-scope component contains a number of functions a different shade of blue is used purely for clarity.

This section describes functions undertaken by system applications. Section 4 briefly describes the functions performed manually.

Each application has been reviewed and a set of requirements that must be applied to CHARM have been identified. Please note that these lists are not exhaustive.

All mandatory requirements are presented with a prefixed identifier of the form *M:[ASIS.xxx.y.z]* and are reproduced from [Ref 4].

3.1 Common Requirements

All of the existing systems generate a time stamped log for each operator or system action, together with any appropriate or relevant information.

The systems also retain any information collected by the systems together with any changes to the status of devices.

3.1.1 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM CHARM and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.2 Tidal Flow

3.2.1 Function

The Tidal Flow application uses signal settings over a seven lane section of the A38M and Gravelly Hill interchange in Birmingham. This provides a tidal flow operational regime by opening and closing lanes to vary the inbound and outbound capacity of the road. It does this by transitioning between a set of Tidal Flow states. These are:

Recovery – with 2 lanes inbound and outbound with 3 closed lanes in the centre of the carriageway.
2-In-3-Out – 3 lanes outbound and 2 lanes inbound
3-In-2-Out – 3 lanes inbound and 2 lanes outbound
In-City – 2 lanes outbound and 4 lanes inbound
Out-City - 4 lanes outbound and 2 lanes inbound
Normal - 3 lanes outbound and 3 lanes inbound

At all times a buffer lane must be retained between inbound and outbound lanes to ensure adequate separation of traffic.

Before changing states, operators currently review the carriageway using CCTV before changing to the next state.

3.2.2 Status

Tidal Flow is both a critical function and dependent on the existing HATMS. Therefore CHARM must provide equivalent functionality on initial deployment in the West Midlands.

3.2.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue.. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.3 Hard Shoulder Management (HSM)

3.3.1 Function

The HSM application uses variable message sign and signal settings to open and close the hard shoulder on sections of motorway in order to increase capacity at peak times.

CCTV using fixed cameras is used to allow the operator to check that the hard shoulder is clear and safe before opening.

The opening sequence is designed to lead the operator through a set of actions, that currently involves checking images from a number of cameras, and then setting signals, and associated messages, to open the hard shoulder downstream of a signal. There are a number of safety features built into the operation so that the operator can be confident that the hard shoulder is clear. These include maximum periods for checking a section and ensuring that the operator has looked at the image before clicking. The latter is achieved by making the operator click on the image and on a separate Next control. The HSM subsystem also highlights any faulty equipment in the HSM area to the operator before they view the cameras to open the hard-shoulder. This enables the operator to decide if they have adequate signalling before they open the hard-shoulder.

The closing sequence is currently a sequence of VMS and signals setting requests with timed intervals. The timing is important to maintain orderly traffic flow and avoid the hazard of the closing sequence overtaking moving traffic.

Where sequences in adjacent sections overlap, HSM invokes special rules to decide what should be displayed on signals and VMS. In addition if the opening of a link between motorway junctions is interrupted for some reason then a similar, but not identical sequence may be needed, usually to check more of the hard shoulder.

There are also a number of safety requirements that require the opening to be halted if an operators takes too long between inputs.

Alerts generated by MIDAS are used to inform operators of vehicles entering or leaving an Emergency Refuge Areas (ERA).

3.3.2 Status

HSM is both a critical function and dependent on the existing HATMS. Therefore CHARM must provide equivalent functionality for the first deployment.

3.3.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

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3.4 Signals

3.4.1 Function

The Signals application manages the monitoring and control of roadside signals. It monitors the status of all the signal devices and reports any faults detected.

Requests are accepted from both operators and systems. The application has to arbitrate between the conflicting requests and decide which of them should be applied.

The application holds a large and complex rule set that is applied to all requested settings in order to generate safe on-road settings.

3.4.2 Status

The Signals application is both a critical function and dependent on the existing HATMS. Therefore CHARM must provide equivalent functionality for the first deployment.

3.4.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue.~~. However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.5 Message Sign Subsystem (MSS)

3.5.1 Function

The MSS application manages the monitoring and control of roadside variable message signs (VMS). It monitors the status of all the VMS devices and reports any faults detected.

Requests are accepted from both operators and systems. The application has to arbitrate between the conflicting requests and decide which of them should be applied.

The application holds a large and complex rule set that is applied to all requested settings in order to generate safe on-road settings.

3.5.2 Status

Management of message signs is both a critical function and dependent on the existing HATMS. Therefore CHARM must provide equivalent functionality for the first deployment.

3.5.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. ~~. However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.6 Motorway Incident Detection And Signalling (MIDAS)

3.6.1 Function

The MIDAS application manages the monitoring of roadside MIDAS Outstations, including faults, traffic data counts and alerts. Currently configured alerts are based on speed thresholds, flow thresholds, slow vehicle detection and vehicles entering or leaving ERAs.

Traffic Data is distributed through a number of channels, including MIDAS GOLD (See 3.7), which is now the preferred method.

MIDAS maintains a set of configurable data that is sent to MIDAS Outstations to configure them and enable/disable a set of alerts.

MIDAS provides rules that are used to generate signal and VMS setting requests in response to changes in alerts received from MIDAS Outstations. These are the Queue Protection and Controlled Motorways operational regimes.

3.6.2 Status

MIDAS is both a critical function and dependent on the existing HATMS. Therefore CHARM must provide equivalent functionality for the first deployment.

3.6.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue.~~. However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.7 MIDAS GOLD

3.7.1 Function

The MIDAS GOLD application publishes the traffic data and alerts received from MIDAS Outstations as a web service.

The service is used for three purposes:

1) Traffic information to other traffic management or information providers, such as the port of Dover and TrafficLink
2) As input to tools for calibration and tuning of MIDAS installations
3) Research

Currently the service provides each record with the NMCS2 electronic address of the virtual site and a timestamp. The traffic data and alert information is presented as it is received from the MIDAS subsystem. The data is used for the calibration and optimisation of Smart Motorways, answering HAIL enquries and identifying faulty MIDAS loops. This format will no longer be appropriate when CHARM is deployed.

3.7.2 Status

MIDAS GOLD provides a service to a number of key internal functions but only a small set of external users, mainly for research. CHARM will have to provide similar internal services on first deployment but the format and technology are likely to be different.

3.7.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.8 Meteorological Subsystem (Met)

3.8.1 Function

The Met application manages the monitoring of specialist weather stations on the roadside. These outstations report faults and alerts. Most of these outstations are directly connected to the Met application through NRTS but a number are managed through the COBS.

The outstations are separate from those managed by HAWCS for HAWIS.

Met provides rules that are used to generate signal and VMS setting requests in response to changes in information received from weather stations.

The Met subsystem also provides a graphical display which enables trends to be judged and signals set.

A description of the existing Met application can be found in reference 19.

3.8.2 Status

The weather information provided by Met is both a critical function and dependent on the existing HATMS. Therefore CHARM must provide equivalent functionality for the first deployment.

3.8.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.9 Tunnel - Removed

~~3.9.1 Function~~

~~The Tunnel application provides an interface between the RCC and the various tunnel systems. Its main function is to present the status of important tunnel devices, such as ventilation and lane control signals, to operators.~~

~~3.9.2 Status~~

~~This application will be decommissioned when CHARM deploys. However CHARM may have to interface to the SCADA systems within the tunnels to report status.~~

~~3.9.3 CHARM Requirements~~

~~None – the functionality within this application is not required by CHARM.~~

3.10 HA Urban Traffic Management Centre (UTMC)

3.10.1 Function

The HA UTMC application allows operators to see the status of traffic signals managed by the HA, and to modify the timings of those signal using pre-set plans.

3.10.2 Status

UTMC control of traffic signals, although important, is not critical to traffic management. In addition it is currently supported by a standalone system, which could continue to operate after the deployment of CHARM.

The UTMC application could therefore be part of a phased deployment of CHARM, subject to agreement between the supplier and the HA.

In some areas the HA is considering how to incorporate the control and monitoring of other UTMC compliant devices, such as tunnels, using UTMC. This will be discussed during CHARM development.

3.10.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.11 MidNight Switch Off (MNSO) - Removed

~~**3.11.1 Function**~~

~~The MNSO application automatically turns off motorway lighting by areas against an agreed timetable.~~

~~RCC operators can use the application to switch the lights back on in certain circumstances.~~

~~An interface is provided to supply reports for power distribution companies to support the various discounting schemes.~~

~~**3.11.2 Status**~~

~~Control of lighting, although important, is not critical to traffic management. In addition it is currently supported by a standalone system, which could continue to operate after the deployment of CHARM.~~

~~The MNSO application could therefore be part of a phased deployment of CHARM, subject to agreement between the supplier and the HA.~~

~~**3.11.3 CHARM Requirements**~~

~~Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM. However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.12 HA Road Lighting Control System (HARLiCS) - Removed

~~**3.12.1 Function**~~

~~HARLiCS builds on the functions provided by MNSO to provide a system interface.~~

~~**3.12.2 Status**~~

~~Control of lighting, although important, is not critical to traffic management. In addition it is currently supported by a standalone system, which could continue to operate after the deployment of CHARM.~~

~~The HARLICS application could therefore be part of a phased deployment of CHARM, subject to agreement between the supplier and the HA.~~

~~**3.12.3 CHARM Requirements**~~

~~No additional requirements.~~

3.13 MIDAS Operated Road Lighting Control System (MORLiCS)

3.13.1 Function

MORLICS ~~uses HARLiCS to automatically~~ automatically ~~switch~~ adjusts ~~on the~~ lighting levels based on traffic volumes currently provided by MIDAS GOLD.

3.13.2 Status

Control of lighting, although important, is not critical to traffic management. ~~In addition i~~It is currently supported by a standalone system that uses the MIDAS GOLD Central data. Although the ATMS is expected to contain the capability to apply business logic to lighting based on the traffic flow data received by the system, the actual interface to lighting controllers has not been specified and is out of scope.~~, which could continue to operate after the deployment of CHARM.~~

~~The MORLICS application could therefore be part of a phased deployment of CHARM, subject to agreement between the supplier and the HA.~~

3.13.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue.~~ However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.14 Ramp Metering - Removed

~~3.14.1 Function~~

~~The Ramp Metering application is installed at each ramp metering site~~

~~Operators, although not currently those at the RCC, can use a web site to view the queue length and operation, as well as the enabled/disabled status of the site.~~

~~3.14.2 Status~~

~~Ramp metering, although important, is not critical to traffic management. In addition it is currently supported by a standalone system, which could continue to operate after the deployment of CHARM.~~

~~The Ramp Metering application could therefore be part of a phased deployment of CHARM, subject to agreement between the supplier and the HA~~

~~3.14.3 CHARM Requirements~~

~~Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM. However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.15 Mobile VMS - Removed

~~3.15.1 Function~~

~~Mobile VMS are widely used on the Strategic Road Network. They are set to display a message in a variety of ways, including SMS text messages.~~

~~3.15.2 Status~~

~~Control of Mobile VMS, although important, is not critical to traffic management. In addition it is currently supported by standalone systems, which could continue to operate after the deployment of CHARM.~~

~~The Mobile VMS application could therefore be part of a phased deployment of CHARM, subject to agreement between the supplier and the HA~~

~~3.15.3 CHARM Requirements~~

~~Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM. However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.16 Highways Agency Video Client Gateway (HVCG)

3.16.1 Function

Permissions server for CCTV access. Provides user permission services to most of the following applications:

- HAVID: Temporary and mobile CCTV cameras are widely used in road works to monitor safety. They are often monitored and controlled by Service Providers, but there are also an increasing number of 3G connected cameras that use the HAVID to connect to RCCs. The cameras are a mixture of fixed and Pan Tilt Zoom (PTZ). The cameras present to the instation as per normal NRTS connected CCTV cameras via the HAVID system.
- Highways Agency Video Access Client Interface (HVACI): The HVACI provides two way access between external CCTV systems and the HA CCTV system.
- Automated Camera Tester: The ACT connects to cameras, to test video and control functions of the camera. The ACT connects via the EDGE CLIENT.
- Enhanced Video Clients: Video clients for remote or external locations for accessing the HA CCTV network, including facilities such as text overlay.
- EDGE Client: Provides part of the backend system for HACCTV for video streaming and camera control to specific users of the HACCTV service.
- HANET: Provides part of the backend system for HACCTV for still images supplied to 'normal' users of the HACCTV service.
- TVBS: Control of PTZ cameras and switching requests for video streams.

3.16.2 Status

Management of CCTV access, profiles and permissions is both a critical function and dependent on the existing TVBS. Therefore CHARM must provide equivalent functionality for the first deployment.

3.16.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue.. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements~~.

3.17 NMCS2 local Communications Controller (LCC)

3.17.1 Function

The LCC acts as a switch for commands and requests from the rest of the RCC systems to the NMCS2 legacy equipment, specifically signals, VMS, fog detectors and ambient light monitors.

In current implementations it also hosts a set of virtual transponders. Transponders are mainly switching devices but do manage a small number of local functions such as synchronising the flashing of signs and signals.

3.17.2 Status

The management of legacy devices is both a critical function and dependent on the existing HATMS. Therefore CHARM must provide equivalent functionality for the first deployment.

3.17.3 CHARM Requirements

The NMCS2 LCC supports a complex interface between the HATMS equipment and a range of roadside devices. Because of that complexity it is not appropriate to reference the entirety of TR2046. The requirements below represent those requirements that must be met by CHARM. Where a requirement must be met in full it is referenced below (ASIS.178.1.5), otherwise a revised requirement has been provided.

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements~~.

3.18 MIDAS LCC

3.18.1 Function

The MIDAS LCC monitors all of the MIDAS Outstations and receives traffic data and alert data.

It also downloads their configuration to Outstations when they restart and modifies it to enable and disable alerts as required as part of network management. For example queue protection is disabled for the hard shoulder when it is closed.

3.18.2 Status

The management of legacy MIDAS is both a critical function and dependent on the existing HATMS. Therefore CHARM must provide equivalent functionality for the first deployment.

3.18.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM~~.~~ and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.19 Traffic Management Systems Data Entry Package (DEP)

3.19.1 Function

The DEP is responsible for validating the configuration data, often called “Site Data” in existing HATMS installations. The business rules governing that data are managed as code and data tables within a Microsoft Access database.

It is used as a source of the master configuration data and generates files for use by HATMS.

“Site Data” is a comprehensive description of all the roadside devices controlled by HATMS (COBS, Signals, MSS etc), their relationships and how they can be controlled.

There are a number of HA teams that use HATMS configuration data for maintenance and engineering. For example TPMS uses HATMS configuration data in business rules for reporting faults.

3.19.2 Status

Managing the configuration of the system is a critical function and its improvement is one of the key business benefits of CHARM. Therefore CHARM must provide equivalent functionality for the first deployment.

3.19.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue.~~ However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.20 Gazetteer Database

3.20.1 Function

The Gazetteer database is a list of locations gleaned from a variety of sources, including HATMS site data, ERT directory etc. Currently every asset location is included.

It provides some, mainly manual, validation of the data and is loaded into the Command & Control system.

3.20.2 Status

Managing the configuration of the system is a critical function and its improvement is one of the key business benefits of CHARM. Therefore CHARM must provide equivalent functionality for the first deployment.

3.20.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.21 CCTV Spreadsheet

3.21.1 Function

The CCTV Spreadsheet, maintained by NRTS, is a list of locations of CCTV sites, test inputs (black screen etc) and outputs (operator displays, DDS inputs etc). It identifies how each input and output can be addressed by the TVBS and other CCTV systems.

It provides some, mainly manual, validation of the data. It is manually maintained in line with the database of CCTV held within NRTS.

3.21.2 Status

Managing the configuration of the system is a critical function and its improvement is one of the key business benefits of CHARM. Therefore CHARM must provide equivalent functionality for the first deployment.

CHARM will be expected to maintain information about cameras as part of a common asset and configuration data set with all other roadside devices, including those currently appearing in the Gazetteer (section 3.20).

3.21.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.22 MMCALO

3.22.1 Function

The Managed Motorways Calibration and Optimisation tool is used to calculate the optimum configuration for MIDAS Outstations for managing congestion. The MIDAS Outstation configuration is a set of speed and flow thresholds to be downloaded.

Calibration identifies the appropriate flow thresholds which set and remove signal settings, including opening or closing a Dynamic Hard Shoulder running lane, by reference to observed or expected system performance. The calibration process continues until all Operational Regimes have gone live, post System Handover.

Optimisation provides continual improvement to a scheme through an ongoing period of monitoring and adjustment following implementation of the Operational Regimes, post System Handover.

3.22.2 Status

Managing the configuration of the system is a critical function and its improvement is one of the key business benefits of CHARM. Therefore CHARM must provide equivalent functionality for the first deployment.

Some of the MMCALO functionality is the intellectual property of other parties. This includes the MTV Plot display that is the property of TRL. If this feature is required it may be necessary to make a contractual agreement with TRL.

The functionality of the MMCAL tool is described in ref 41, Guidance for the calibration and optimisation of Managed Motorway Systems.

3.22.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM, and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

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3.23 Sension Reporting

3.23.1 Function

Sension provides reports, including real-time dashboards, primarily ERT and PSTN usage and call answering. In addition it can provide reports about Two-Way Radio,

3.23.2 Status

Good quality reporting is critical and its improvement is one of the key business benefits of CHARM. Therefore CHARM must provide equivalent functionality for the first deployment.

3.23.3 CHARM Requirements

M:[ASIS.185.1.1] The system must provide a reporting function that includes initiating, answering and completing ERT and PSTN calls.

M:[ASIS.185.1.2] The system must provide a reporting function that includes initiating and completing calls on radio talk groups

3.24 TTC ERT Data

3.24.1 Function

The Telephone Text Controllers allow RCC operators to initiate non-voice communication, or “Text Facility” for customers using ERTs who have difficulty with spoken communication in English, or are hard of hearing. The text facility allows the customer to provide ‘Yes’ and ‘No’ answers to a pre-programmed “question tree” prompter by an RCC operator. This facility is described in section 4.4 of reference 18. Further technical details are contained in sections 8 and 11 of reference 21.

3.24.2 Status

ERTs are part of the statutory requirements for operating the motorway. Provision of text facility is required to provide access to ERTs for the hard of hearing and other users. Therefore CHARM must provide equivalent functionality for the first deployment.

The modems currently in use will remain and are Multitech MT5656ZDX-V and the connection to the modems is RS232, based on IBM-AT and is interrupt driven.

The TTC PC (and existing software) that currently exists in the TMCs from which the serial connections to the modems are made, will not be retained. The CHARM system is expected to integrate this functionality, however considering that a serial connection must still be made to the modems, the Agency accepts that a PC will be required. This should be described in the CHARM system design and the Agency will procure the appropriate hardware.

3.24.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.25 Audionet Voice Recording

3.25.1 Function

The Audionet product records audio from all ERTs, Public Switched Telephone (PSTN) and two-way Radio calls made and received by the RCC.

3.25.2 Status

Voice Recording is required to provide evidence of control room activity. Operating without this evidence would not be acceptable to the HA. Therefore CHARM must provide equivalent functionality for the first deployment.

3.25.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.26 ICCS

3.26.1 Function

The Integrated Communications Control System (ICCS) is an application for switching between audio channels including: ERTs, Airwave two-way Radios and the PSTN. It is operated using a dedicated touchscreen. Operators can call, and receive calls from, ERTs, telephones on the PSTN network and Airwave talk groups.

It also allows operators to select and replay real-time recorded conversations.

The current facilities provided by the ICCS are described in reference 17.

3.26.2 Status

Handling voice calls, as provided by ICCS, is both a critical function and dependent on the existing ICCS. Therefore CHARM must provide equivalent functionality for the first deployment.

In addition the features provided by ICCS, and their usability, are well regarded by the Traffic Officer Service. The replacement will have to be at least as capable.

3.26.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue.~~. However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.27 Command & Control

3.27.1 Function

The Command & Control (C&C) system provides a wide range of functions to the RCC operator. Because of the complex nature of this system its description has been broken down into its constituent functions.

1) Exchange of data between the Driver & Vehicle Licensing Agency (DVLA) and C&C allows the operator to request a limited set of details for a vehicle registration.
2) Data enquiry between Police National Computer (PNC) C&C allows operators to ask for details of a vehicle, including whether it has been marked as “of interest” from the (PNC).
3) Data exchange between Police forces and C&C. Operators can send one or more report lines from an incident log to a police force and receive similar information via the criminal justice interface (CJX).
4) Vehicle recovery data exchange with C&C. Operators are able to exchange information, through electronic forms via CJX, with the National Vehicle Recovery Manager to organize the recovery of abandoned vehicles to a safe place.
5) Incident Recording – Every action taken by operators is logged against an incident including phones calls, radio calls and resource allocation. These entries are all date and time stamped. In addition operators can add form based log records to incidents. These incidents are then used as the basis for operational reporting.
6) Gazetteer data exchange with C&C maintains a list of locations. These include the locations of roadside devices (for example ERTs and Signals) but also, crucially, locations with particular hazards and where resources, such as drainage and access can be found.
7) C&C integrates ESRI Mapping, a configurable mapping facility, that can display resources, incident locations and gazetteer items on a number of selectable maps.
8) Resource Allocation Personnel – C&C allows personnel to be allocated to a task, by sending an appropriate data message through Airwave, as part of handling an incident. Traffic Officers are associated with a vehicle resource as part of the Book On/Off process
9) Resource Allocation Vehicles - C&C uses the Automatic Vehicle Location data from Airwave to locate Traffic Officer vehicles on the network. It also allows vehicles to be allocated to a task, by sending an appropriate data message through Airwave, as part of handling an incident. C&C understands that deploying a vehicle also deploys the associated personnel.
10) Book On/Off – C&C uses Airwave data messages to enable Traffic Officers to report for duty (book-on) and book-off at the end of their shift

A full specification of the Command & Control systems is included in reference 22.

3.27.2 Status

Command & Control is both a critical function and dependent on the existing system. Therefore CHARM must provide equivalent functionality for the first deployment.

3.27.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue.. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.28 Roads Information Framework (RIF) system

3.28.1 Function

RIF takes information from multiple systems including amongst others: incident logs on the C&C system, asset status from the Highways Agency LOGging ENgine (HALOGEN) and traffic information from Highways Agency Traffic Information System (HATRIS) and loads them into a database used for reporting.

3.28.2 Status

CHARM will completely replace the C&C system and other systems on which RIF is dependent and so will subsume the RIF functions.

Good quality reporting is critical and its improvement is one of the key business benefits of CHARM. Therefore CHARM must provide equivalent functionality for the first deployment.

3.28.3 CHARM Requirements

M:[ASIS.190.1.1] The system must provide a reporting function that includes logs generated for incidents.

3.29 COBS

3.29.1 Function

The Control Office Base System (COBS) acts as a central node for the current HA Traffic Management System (HATMS). It is the central node for routing messages between subsystems, Local Communication Controllers (LCC), Operator InterFaces (OIF). It provides local logging and reporting functions, before transferring those logs to Halogen.

The COBS also manages the roadside Ambient Light Monitors (ALM)

3.29.2 Status

COBS is a construct of the HATMS architecture and therefore will be superseded by CHARM. However, the functions COBS provides are critical and their improvement is one of the key business benefits of CHARM. Therefore CHARM must provide no less than equivalent functionality for the first deployment.

ALMs are both critical and dependent on the existing HATMS. Therefore CHARM must provide equivalent functionality for managing ALMs for the first deployment.

3.29.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.30 HALOGEN

3.30.1 Function

Halogen acts as a Data Warehouse for HATMS, and some other system, logs. It also provides a number of reporting tools based on that Data Warehouse.

3.30.2 Status

Halogen is dependent on the HATMS and TVBS systems that will be replaced by CHARM and the functionality of Halogen, at least for operational logging, and reporting will be subsumed by CHARM.

Good quality reporting is critical and its improvement is one of the key business benefits of CHARM. Therefore CHARM must provide equivalent functionality for the first deployment

~~However the Halogen logging formats are inappropriate for CHARM and new formats will have to be agreed between the supplier and the HA, including the Streamlined Data Services project.~~

3.30.3 CHARM Requirements

None specific to HALOGEN.

3.31 FEP Front End Processor

3.31.1 Function

The FEP acts a local cache between COBS and Halogen.

3.31.2 Status

FEP is a construct of the HATMS architecture and therefore will be superseded by CHARM.

3.31.3 CHARM Requirements

None

3.32 Operator Interface (OIF)

3.32.1 Function

The OIF provides the operator interface for the current HATMS.

3.32.2 Status

The current OIF is a construct of the HATMS architecture and therefore will be superseded by CHARM.

3.32.3 CHARM Requirements

None

3.33 Dynamic Display System (DDS)

3.33.1 Function

The DDS drives the large screen displays within each RCC Control Room. These displays provide operators with a summary of the current situation on roads of interest. The displays are built from a number of sources including:

1) Graphical data from the COBS.
2) CCTV Imagery from cameras managed by NRTS and external organizations
3) Imagery from systems, such as Met
4) External video feeds, such as news channels

3.33.2 Status

Providing imagery to the DDS displays is a critical function. Therefore CHARM must provide equivalent or better functionality for the first deployment.

Note that only the provision of suitable imagery for display on the DDS hardware is in scope of CHARM, not the DDS hardware/software,

3.33.3 CHARM Requirements

CHARM is not expected to provide the CCTV Imagery or external feeds.

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.34 Crestron

3.34.1 Function

The Crestron system manages the layout of the DDS screens in some RCCs. It provides pre-set plans for displays as well allowing suitably authorised individuals to edit those layouts.

There are similar systems in other RCCs but the expectation is that CHARM will provide a single application to achieve this function.

3.34.2 Status

Managing the display of imagery on DDS displays is a critical function. Therefore CHARM must provide equivalent functionality for the first deployment. The Creston system itself it not being retained.

3.34.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.35 TVBS

3.35.1 Function

The TeleVision Base Station provides the CCTV management and Control interface. It allows users, both systems and people, to switch video imagery from cameras to displays and other outputs.

It manages role based business rules that control access to imagery, camera control, and outputs. The business rules include limitations on camera access based on camera position and zoom level.

It currently reports faults detected with cameras to Halogen.

The TVBS also control access by external organisations such as TfL, while also allowing operators to select cameras managed by other organisations.

In some areas alerts generated by MIDAS are used to switch camera imagery to designated outputs, often positions on the DDS. This is often called “Adaptive CCTV”. In addition there are a number of incident detection systems such as North West RCC Automatic Incident Detection (NW AID) which detects vehicles stopped on narrow hard shoulder, often using video analysis, that trigger camera switching. In addition in the majority of Managed Motorway sections when a car pulls into an ERA than an alert is sent to the TMC operator and the image is shwn on the DDS.The TVBS also manages a set of security cameras installed to monitor critical infrastructure or access points. Some of these cameras have motion detection which cause a alert to operators.

The TVBS provides management, control and switching of CCTV to the follow connected applications:

- TVBS Windows Operator InterFace (WOIF) provides the operator interface for the TVBS functions. It is separately described below.
- HAVID: Temporary and mobile CCTV cameras are widely used in road works to monitor safety. They are usually monitored and controlled by Service Providers. The cameras are often fixed but there are also PTZ types. The cameras present to the instation as per normal NRTS connected CCTV cameras via the HAVID system.
- Highways Agency Video Access Client Interface (HVACI): The HVACI provides two way access between external CCTV systems and the HA CCTV system.
- Automated Camera Tester: The ACT connects to cameras, to test video and control functions of the camera. The ACT connects via the EDGE CLIENT.
- Video Clients: Video clients for remote or external locations for accessing the HA CCTV network.
- EDGE Client: Provides part of the backend system for HACCTV for video streaming and camera control to specific users of the HACCTV service.
- HANET: Provides part of the backend system for HACCTV for still images supplied to ‘normal’ users of the HACCTV service.
- HVCG: User permissions for CCTV access.

3.35.2 Status

Managing access to cameras and their imagery is both a critical function and dependent on the existing TVBS. Therefore CHARM must provide equivalent functionality for the first deployment

3.35.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue.~~. However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.36 TVBS Windows Operator InterFace (WOIF)

3.36.1 Function

The TVBS WOIF provides a user interface for the TVBS and operator control of cameras. A joystick and other controls are provided for operators to control the PTZ cameras. A display is provided for all the CCTV imagery available to the operator.

3.36.2 Status

The control and display of cameras is both a critical function and dependent on the existing TVBS. Therefore CHARM must provide equivalent functionality for the first deployment

3.36.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue.~~. However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.37 AVL

3.37.1 Function

The AVL system processes alerts received from cameras and processes them to detect conditions, such as PIR triggers for critical infrastructure documents. These are then passed to the TVBS for action.

3.37.2 Status

Equivalent functionality will be required for CHARM but the AVL is tied to one manufacturer's version of the TVBS and is therefore redundant once CHARM is deployed.

3.37.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue.~~. However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.38 Video Replay – Retrieval from Network Video Recorder

3.38.1 Function

NRTS records all of the imagery from HA cameras and holds it online for a HA prescribed period on Network Video Recorders (NVRs). RCC operators have access to this imagery and use tagged portions for debriefing and other reports. This footage is also available to be burned on to DVD if required.

3.38.2 Status

Video replay is currently supported by a standalone system, which ~~could continue to operate after the deployment of CHARM.~~is to be replaced by CHARM. The Network Video Recorders are out of scope, and video recording (and temporary – up to 30 days – storage) will continue to be provided by the network infrastructure provider. CHARM is expected (outlined in the requirements catalogue) to retrieve video clips from the NVRs for permanent storage; for example in relation to an incident.

~~The Video Replay application could therefore be part of a phased deployment of CHARM, subject to agreement between the supplier and the HA. However Video Replay is currently provided under the NRTS contract which ends in 2016 and so a replacement must be in place before then.~~

3.38.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue.~~ However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.39 Local Video Matrix

3.39.1 Function

The Local Video Matrix is used during hard shoulder opening to buffer the camera imagery. This overcomes a limitation on switching speed imposed by the video decoders and the variability of video switching times.

3.39.2 Status

Managing the Local Video Matrix is both a critical function for HSM and dependent on the existing HATMS. Therefore CHARM must provide equivalent functionality for the first deployment. For example, based upon how the system supplier integrates digital video (from the analogue outputs in the TMC), the analogue video matrix may no longer be required.

3.39.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM~~.~~ and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.40 Multi-Viewer

3.40.1 Function

In order to ensure that the hard shoulder cameras provide complete coverage the HSM subsystem displays two juxtaposed camera images from adjacent cameras and prompts the operator to check the coverage.

This requires a specialist hardware component that merges two images into one.

CHARM will either have to replicate this function or provide an alternative.

3.40.2 Status

The Multi-Viewer is currently required due to the use of analogue video in the TMC. The CHARM system is expected to integrate said video (via the usage of encoders / video capture cards etc. based upon the suggeste design by the CHARM supplier). Managing the Multi-Viewer both a critical function for HSM and dependent on the existing HATMS. Therefore CHARM must provide equivalent functionality for the first deployment.

3.40.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.41 NTIS

3.41.1 Function

NTIS provides the following key functions:

1) TrafficEngland and TrafficEngland Pro websites
2) Publication of traffic information through web services
3) Strategic traffic management through advisory messages and strategic diversions
4) Traffic modelling to inform traffic management
5) National traffic flow information fused from MIDAS, FVD, TMUs and TAME
6) Interface to Inrix, which provides Floating Vehicle Data (FVD) and flow predictions in exchange for traffic data from HA devices.
7) Handling of TMUs and collection of their traffic data
8) Handling of TAME sites and collection of their traffic data
9) Receipt and re-publication as a Datex II service of MIDAS Gold data
10) Handling of ANPR data
11) Calculation and display of Journey Time predictions

3.41.2 Status

NTIS is provided under a contract that will run until August 2018. CHARM must be able to provide NTIS with the data and services it requires between the initial deployment of CHARM and the incorporation of the systems by CHARM. The date of that incorporation, and how the NTIS services will be managed, remains subject to discussion and agreement within the HA.

The HA intend to verify that the CHARM solution is able to incorporate all of the NTIS services, with the exception of the TrafficEngland and TrafficEnglandPro websites, as part of the acceptance process.

It should be noted that CHARM will be deployed within the NTOC, as a replacement for the ICCS and C&C systems already deployed within the NTOC, before August 2018.

After August 2018 the Traffic England and TrafficEnglandPro websites are expected to be the subject of a separate contract.

3.41.3 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. Please note that NTIS will no longer be regarded as a separate function once the CHARM system is rolled out, and the Requirements Catalogue instead focuses on the concept of national / regional roles.~~. However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

3.42 NTIS HGS

3.42.1 Function

This system provides a link between NTIS and the HATMS in each RCC. It allows NTIS to request the setting of VMS within an RCC and provides NTIS with the status of each HATMS device.

3.42.2 Status

NTIS is provided under a contract that will run until at least 2018. Before that date CHARM will have to provide NTIS with the data and services it requires but CHARM does not need to replace NTIS before 2018. After that date the integration between CHARM and NTIS will depend on the HA's strategy for taking forward the NTIS services.

Currently the HGS provides the data and services for NTIS. The HA, NTIS supplier and CHARM supplier will have to agree how to meet any other NTIS requirements for data and services before 2018.

3.42.3 CHARM Requirements

None.

3.43 Inrix

3.43.1 Function

Inrix is Software as a Service (SaaS) that provides a complex set of functions including:

1) Fusion of traffic data from MIDAS, TAME, TMU and ANPR systems with Floating Vehicle Data (FVD) collected by Inrix.
2) Profiling of traffic against the road network
3) Speed and flow forecasts

3.43.2 Status

Inrix is provided under the NTIS contract that will run until at least 2018. Before that date Inrix will be provided by NTIS. After 2018 CHARM may choose to use Inrix, or a similar service, to meet the additional requirements the incorporation of NTIS will entail.

3.43.3 CHARM Requirements

None.

3.44 SKRIBE

3.44.1 Function

SKRIBE is a KVM type system that allows operators to switch their displays, keyboards and mice between discrete systems, for example COBS OIF and TTC ERT Data.

3.44.2 Status

SKRIBE will not be required by CHARM, which will be an integrated system for operators.

3.44.3 CHARM Requirements

None.

4. Manual Functions

There are a number of functions currently performed manually. This section describes the key functions that CHARM will be expected to support. They are briefly described here for information, and to illustrate their interaction with other applications.

The business requirements, defined elsewhere, fully describe how CHARM should support these functions.

4.1 Traffic Officer Functions

Many Traffic Officer tasks around managing staff have to be undertaken manually using HA business applications and browser based services. The list below is not complete but illustrates the range of tasks and information sources.

4.1.1 Rostering Personnel

Supervisors use the HR systems for managing leave to roster staff on shifts and to depots.

4.1.2 Rostering Vehicles

Supervisors use the information from HA systems manage vehicles and their allocation to depots and shifts.

4.1.3 Briefing and Information Gathering

Briefings are prepared for Traffic Officers and other staff, including HA management on events and incidents. Information is gathered from NTIS, HAWCS, PNC, Halogen, WRF1, ESDAL and other internet sources provided by both HA and other organisations.

4.1.4 Debriefing

Debriefing in order to review incident handling uses many information sources but makes extensive use of Halogen and RIF.

4.1.5 Fallback and Restore

Not all of the key RCC systems, in particular the COBS and HATMS systems, are designed for transferring tasks between RCCs, whether as a result of failure or for load balancing. The RCC have manual processes that mitigate some of the problems and allow a limited fallback, and then restore capability.

4.1.6 PNC Update

Selected staff in the RCCs have access to the PNC for a limited set of update capabilities. These include the ability to remove some markers, for example when a vehicle is recovered from the scene of the incident. The scope of these facilities may increase over the next few years to include property files and Schengen markers.

Currently the PNC does not allow any access, even from Police systems, to the update functions and so, for the moment, it is not possible to identify any requirements for CHARM.

4.2 TMC Liaison

The RCC staff use telephone, e-mail and fax to communicate with a number other TMCs and organisations interested in traffic. These include:

Local Authority Co-ordination
Bridge/Tunnel Operators
Traffic Scotland/Wales
Ferry Operators
Docks and Harbours

4.3 Reporting

Traffic officers produce reports based on the information extracted by RIF to measure the service KPIs and produce the National Dashboard.

4.4 System Configuration

Some aspects of this group have already been discussed under DEP, Gazetteer database and CCTV Spreadsheet. There are teams of support staff and consultants managing a large number of different configuration and commissioning processes, supported by bespoke tools and applications.

5. Inflight Projects

The following projects, whether in-progress, planned or under consideration have the potential to affect the CHARM requirements. In many cases the detailed impact is not fully understood but where there is a clear requirement on CHARM it is stated.

5.1 NTIS Transformation – In Progress

The NTIS Transformation project is delivering the NTIS, HATMS Gateway Service (HGS) and NTIS Components.

NTIS replaces NTCC and will be responsible for public dissemination of traffic and travel information for the HA.

The NTIS website provides information about traffic that will continue to be accessed by Traffic Officers in the RCCs. In the future NTIS may be able to provide system level services, for example traffic data from Inrix (a service providing floating vehicle data on traffic speeds) and TMUs, that could be used by CHARM.

The NTIS Transformation project is replacing the existing TCCI subsystem with a similar HGS. HGS uses COBS services to provide the following services to NTIS:

1) Publication providing the current status of VMS within the RCC areas
2) Publication providing the current status of the signals within the RCC areas
3) Publication providing the current status of each Managed Motorway Link, as reported by HSM
4) External access to set VMS within the RCC area

NTIS Transformation has already delivered a set of services, based on MIDAS GOLD, that provide a Datex II publication of all traffic data collected by MIDAS and all alerts generated MIDAS Outstations.

The broader CHARM requirements mandate exchange of incident information using open standards, such as Datex II, that can be used to exchange information with NTIS.

The Highways Agency will make available the NTIS ~~software and~~ specifications to suppliers for re-use as appropriate as part of the inclusion of services currently provided by NTIS within the CHARM provision. For specific interfaces, please see the HA Interface Requirements Specification.

5.1.1 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue. Please note that they are not specific NTIS functional requirements, rather, all requirements in the catalogue apply and NTIS will be replaced by a 'national' role within the CHARM system. ~~However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

5.2 Streamlined Data Services – Planned

There is an on-going project to replace Halogen, NFDB, PEW and the TPMS asset/ fault management systems. The technical solution is not yet agreed and so the impact on CHARM is unclear.

However it is expected that any faults detected will have to be reported to the replacement service.

5.2.1 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue.~~. However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

5.3 NRTS II – Planned

The replacement NRTS II contract is likely to support the deployment of a national system such as CHARM but be broadly transparent to CHARM applications.

The management and control of CCTV is being reviewed as part of the procurement exercise. It is likely that there will be some changes but no details are available yet.

5.3.1 CHARM Requirements

~~Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM. However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~None.

5.4 HAWIS take-over of Met Stations - Envisaged

It is expected that devices currently managed by the Met subsystem will migrate to be part of the HAWIS network and managed by HAWCS. If this occurs current functionality around the display of message signs in response to wind and fog events may have to be achieved using inputs from HAWCS.

5.4.1 CHARM Requirements

Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM and these are outlined / referenced in the Requirements Catalogue.~~. However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~

5.5 HRNS and Full Business Continuity for RCCs

The projects are also known as Abbey and Tiberius.

These projects are developing remote log-in to the existing HATMS systems in an RCC. They will be superseded by CHARM, which will include remote log-in to the system.

5.5.1 CHARM Requirements

None ~~identified yet~~

5.6 Nutmeg

This is a project to replace and enhance the existing Black Box monitoring of HATMS.

The Black Box system records all of the message traffic on the HATMS LAN, and so will not be needed as part of CHARM. It will therefore be decommissioned as CHARM is deployed.

5.6.1 CHARM Requirements

None ~~identified yet~~

5.7 HATRIS/RIF Improvement Project

This project aims to build a single corporate Data Warehouse of all the HA's data for analysis and reporting before the end of 2014.

5.7.1 CHARM Requirements

~~Analysis of the existing services has identified a number of detailed requirements which will have to be met by CHARM. However these are not applicable to the current procurement stage. They will be introduced with the detailed requirements.~~Requirements in relation to data / reporting are in the Requirements Catalogue.

5.8 Emergency Services Network (ESN)

The Tetra radio network is expected to be replaced with a new service to be shared across all of the emergency services between 2016 and 2018. There is an expectation that the interfaces will be similar.

5.8.1 CHARM Requirements

There are already requirements for access to emergency services equivalent to Tetra and so no additional requirements have been identified.

5.9 Integrated Asset Management (IAM)

This project is modernising the HA's management of its roadside assets, concentrating on the civil assets. IAM includes the development a Network Occupancy Management Service (NOMS) which will provide information on events that affect road capacity, such as roadworks and abnormal loads.

5.9.1 CHARM Requirements

There are already requirements for access to roadworks information. NOMS will provide the means to meeting that requirement.

5.10 Multi-Agency Incident Transfer

There is an initiative across government to permit the exchange of incident information between a wide range of organisations. It builds on the existing mechanism used by Command & Control to exchange information with Police forces.

This project would, over a number of years, replace the existing EIF.IPP.HA.POLICE interface between the HA's Command & Control and equivalent systems in Police forces.

5.10.1 CHARM Requirements

None

5.11 In-Vehicle Traffic Management (IVTM)

This is a project to provide an in-car display of appropriate traffic signals and message signs.

5.11.1 CHARM Requirements

~~No requirements have yet been identified but this could involve a new information stream.~~None

5.12 ControlWorks

In order to prolong the life of the Command & Control system the core software is planned to be updated to the latest version from the same supplier, called ControlWorks.

5.12.1 CHARM Requirements

Although ControlWorks is a more capable product than the existing C&C system it is still intended to be decommissioned ~~the system~~ as CHARM deploys. There will be no additional requirements for CHARM.

6. Physical Infrastructure

The diagrams in this section illustrate the physical relationship of the various interfaces and infrastructure services. A number of views are provided.

1) Figure 3 - NRTS with RCCs - is of the infrastructure as it relates to an RCC.
2) Figure 4 - NTIS Infrastructure – is of the infrastructure as it relates to NTIS
3) Figure 5 - National NRTS Topology – is the national layout of RCCs and national systems.
4) Figure 6 - Application Locations – shows the locations of components within the physical infrastructure
5) Figure 7 - Interfaces to Other Organisations - depicts the interfaces used to interact with the stakeholders and external organisations introduced in section 2.

6.1 RCC Infrastructure

Each RCC has a dedicated data centre that hosts the HATMS subsystems with connections into NRTS for CCTV and roadside devices.

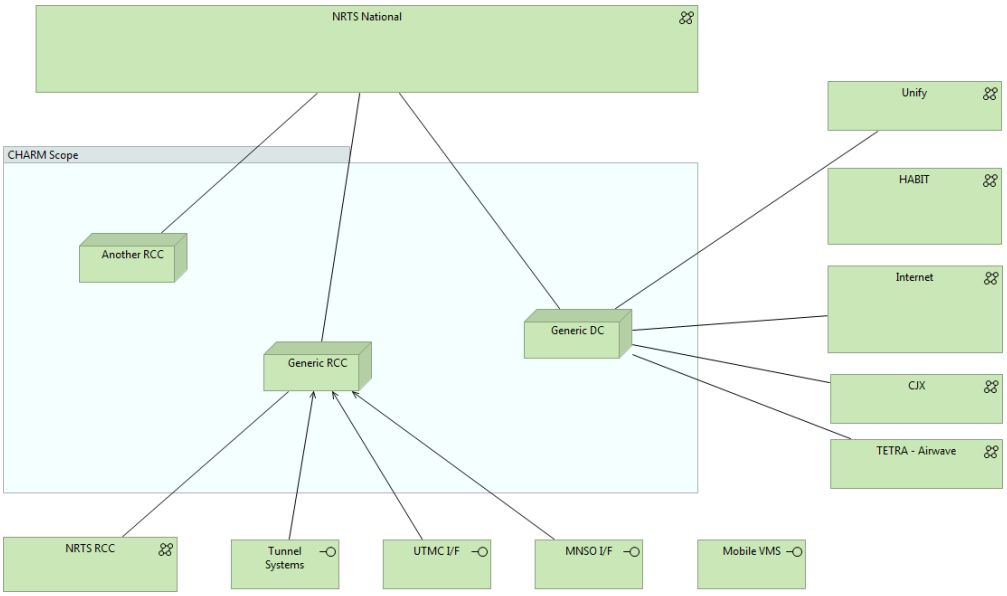

Figure 3 - NRTS with RCCs

6.2 NTIS Infrastructure

The National Traffic Operations Centre is supported by two data centres, one co-located in Quinton and the other in Doncaster.

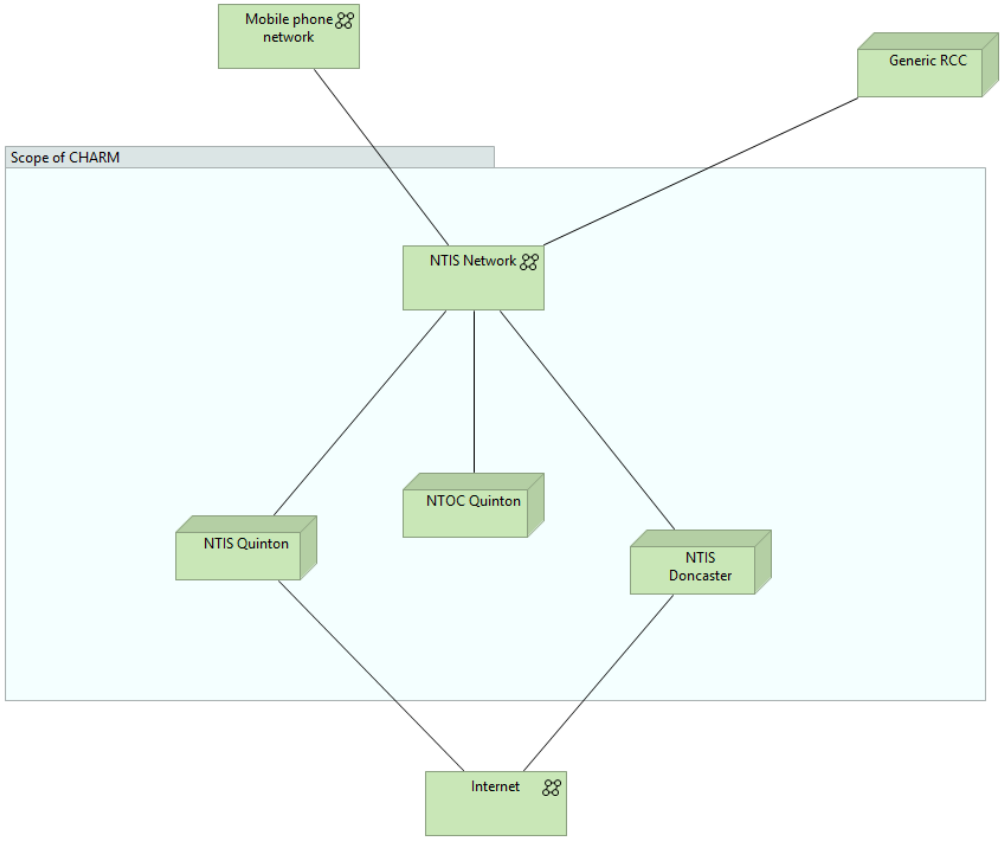

Figure 4 - NTIS Infrastructure

6.3 National Infrastructure

The Highways Agency has seven RCCs, two with generic data centres, and a dedicated data centre in Coleshill. In addition NTIS has a further two data centres and an operations centre. Figure 5 below shows the network topology. The actual network provides resilience and multiple routing.

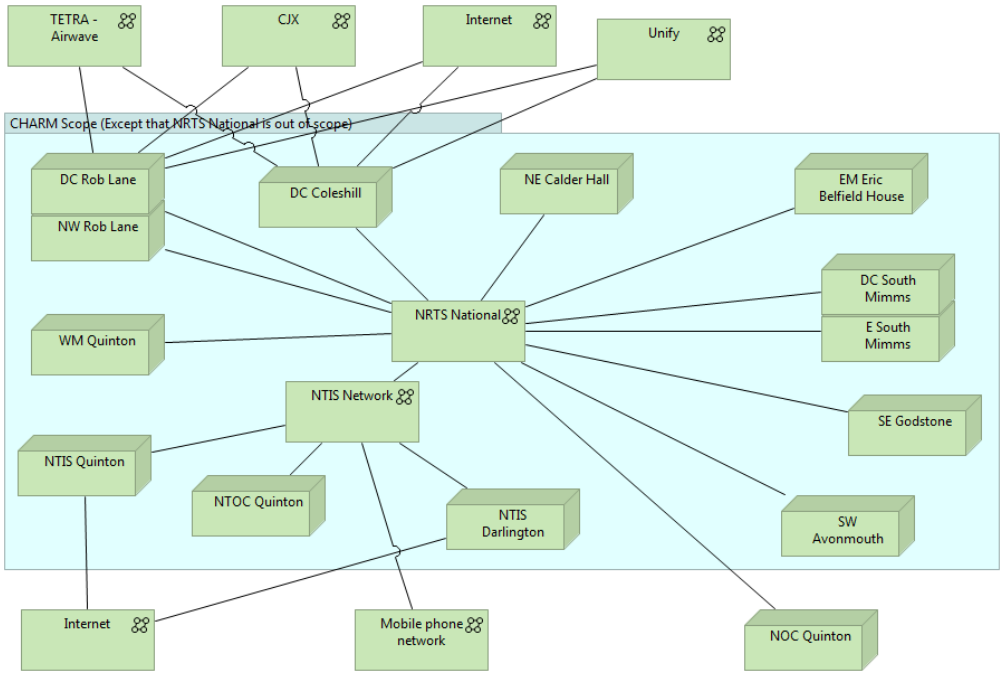

Figure 5 - National NRTS Topology

6.4 Mapping Applications to Locations

Figure 6 below maps each of the principal applications within the scope of CHARM to the hosting arrangements in the RCCs and data centres.

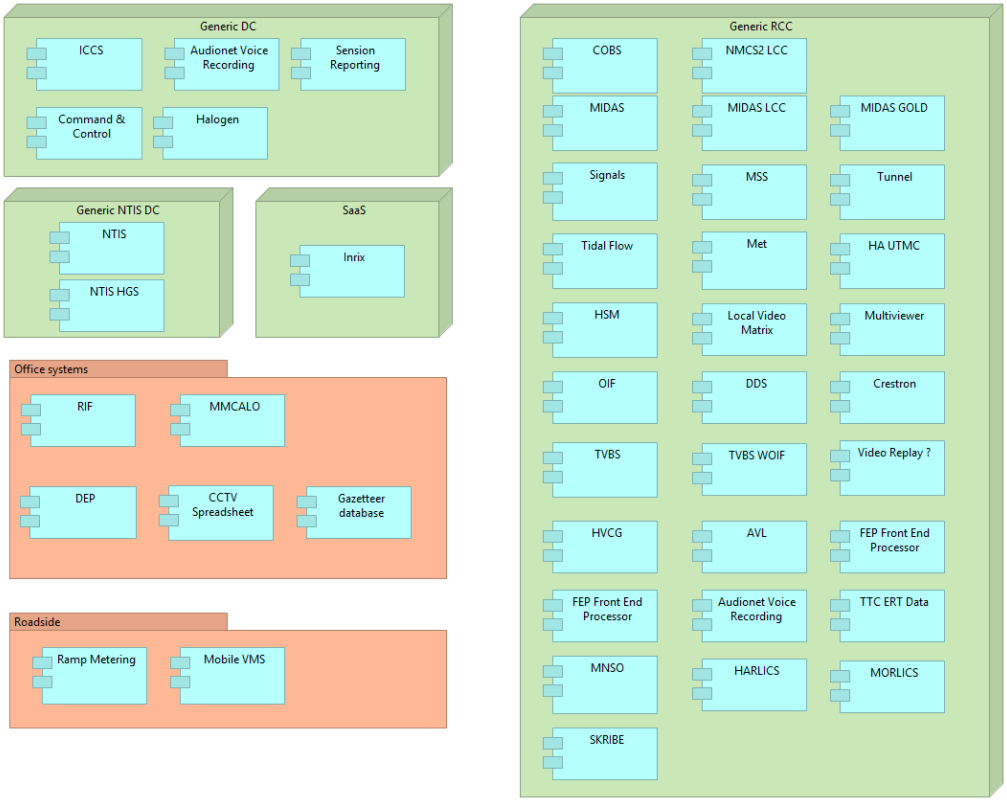

Figure 6 - Application Locations

6.5 Interfaces to Other Partners

The stakeholders identified in section 2 communicate with the RCC and NTIS systems using system interfaces as well as e-mail and telephones.

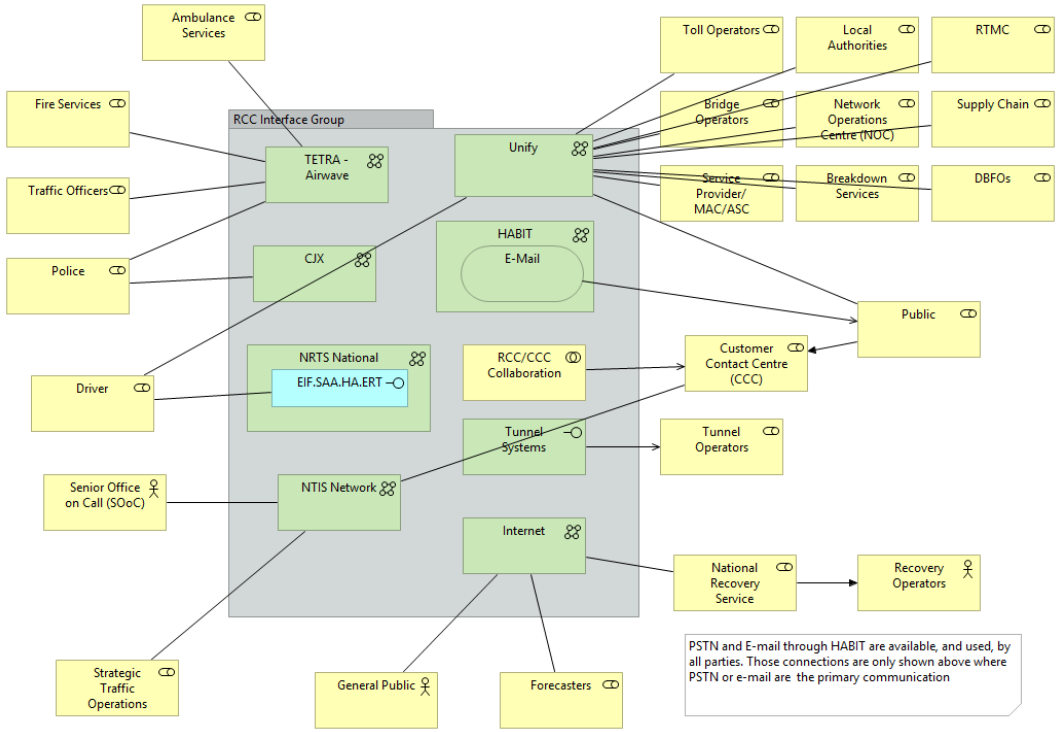

Figure 7 - Interfaces to Other Organisations

7. References

7.1 CHARM Specific Documents

Ref	Reference	Description
1.	0125HA As-Is.Archimate	As-Is Application Landscape model
2.	0104CHARM HA Interface Requirements Specification	Interface Requirements Specification
3.	NVRP interface v0.2	Description of the message exchange for NVRM
4.	Baseline	CHARM Requirements Catalogue
5.	Rijkswaterstaat 2015 As-Is Application Landscapev0.91	RWS As-Is Application Descriptions and Requirements

7.2 Highways Agency Standards and Specifications

Ref	Reference	Description
6.	MCE2103P and changes	NMCS Signal Sequencing Rules Specification
7.	TR2163D and changes	NMCS2 Message Sign Subsystem Rules Specification
8.	TR2020I	NMCS2 Message Control Point to Point
9.	TR2046J	NMCS Standard Local Communications Controller IP Enabled (LCC-IP)
10.	TR2168E	NMCS2 MIDAS Transponder Specification
11.	TR2146G	NMCS2 MIDAS Outstation Link Specification
12.	TR2173L	NMCS2 MIDAS Message Specification
13.	TR2132G	NMCS2 Control Office Base System
14.	TR2139G	NMCS2 Message Sign Subsystem
15.	TR20727H	NMCS2 Signal Subsystem

Ref	Reference	Description
16.	MCH1965D	Ramp Metering System Requirements Specification
17.	MCE0120B	ICCS Statement of Requirements
18.	MCH1983A	Emergency Roadside Telephone Type 354 Implementation Guide
19.	MCH1856D	NMCS Meteorological Subsystem Overview
20.	MCE2201D	NCMS2 Meteorological Subsystem Functional Specification
21.	5000/A/01/IMS issue 1.0	Emergency Roadside Telephone Type 354 Inter-Processor Message Schedule
22.	MCE0119B	Command and Control Statement of Requirements
23.	MCE0114	Video Information Highway HVACI/VC Interface for TVNP CCTV Systems
24.	MCE0118	Video Information Highway Enhanced Video Client (EVC) Specification
25.	MCE2216	Video Information Highway "Management Overview" (not available for download)
26.	MCE2242	Video Information Highway Interface Specification (CCB Spec)
27.	MCE2246	Video Information Highway Video Access Client Interface (HVACI) Specification
28.	MCE2247	Video Information Highway Video Client Gateway (HVCG) Specification
29.	MCE2248	Video Information Highway Video Client (VC) Specification
30.	MCG1380	Video Client Factory Acceptance Test Specification Template

Ref	Reference	Description
31.	MCH1731	Second Generation CCTV VIH Internet Video Server (IVS) Specifications
32.	MCH1734	Second Generation CCTV Video Information Highway – VIH Internet Portal (VIP) Specifications
33.	MCH1781	Video Information Highway Video Edge Client System (VECS) Overview
34.	MCE2239	Highways Agency CCTV Television Base Station Specification
35.	MCE2240	Highways Agency CCTV Centre to Field Communication Specification
36.	MCG1110	Highways Agency CCTV Performance Specification (CCB Spec)
37.	MCH1960	Highways Agency CCTV Management Overview (CCB Spec)
38.	MCH1970	Highways Agency CCTV Notes for Guidance. (CCB Spec)
39.	MCH2530	Technical Requirements for the HA CCTV System
40.	MCH2563	Guidance on HA CCTV System Privacy Settings
41.	MCH2584	Guidance for the calibration and optimisation of Managed Motorway systems
42.	NTIS Agreement	NTIS Agreement including Schedule 2.1

7.3 Abbreviations and Acronyms

Abbreviation		Description
ALM	Ambient Light Monitor	A roadside device measuring the overall brightness of an area. This allows signals and VMS illumination to be accurately set to the most appropriate level for maximum readability
ANPR	Automatic Number Plate Recognition	Specialist cameras able to read number plates. By recording the time the information was recorded journey times can be measured
APTR	All Purpose Trunk Roads	Those parts of the APTR that are not motorways
AVL	Automatic Vehicle Location	Systems for automatically reporting the position of vehicles
C&C	Command and Control	The NSPIS based incident recording and computer aided despatch system used by the HA
CCC	Customer Contact Centre	A project within the HA to take over the handling of general enquiries from the HAIL team and ERT handling from the RCC operators
CCTV	Closed Circuit TeleVision	The overall name for the cameras and video switching systems
CHARM	Common Highways Agency Rijkswaterstat Model	This project, delivering a common solution for traffic management centres in England and the Netherlands
CJX	Criminal Justice eXchange	The Home Office implementation of the GSI network
CMDTE	Centralised Maintenance Depot Terminal Equipment	CMDTE collects status and fault information and generates information on ERT faults
COBS	Control Office Base System	The central management system within HATMS

Abbreviation		Description
Datex II	Data Exchange II	A European standard for the exchange of traffic and travel information
DC	Data Centre	A building equipped with servers and other computer equipment.
DDS	Dynamic Display System	A large screen with multiple video streams displayed on it. Generally used for situational awareness displays in RCC control rooms
DEP	Data Entry Package	Common term with the HA for the application that holds and validates systems data for HATMS
DTMF	Dual-Tone Multi-Frequency	Also known as “Touch Tone”, this is a way of sending simple data across a telephone network as tones.
DVLA	Driver & Vehicle Licencing Agency	The organisation in the UK charged with managing the licencing of both vehicles and drivers.
EDGE		Technology used for a number of video clients
ERA	Emergency Refuge Area	An area, similar to a lay-by, built next to the hard shoulder to provide a place of safety during all lane running on HA motorways
ERT	Emergency Roadside Telephone	Dedicated telephones installed along the APTR to allow drivers to call for help
ESDAL	Electronic System for Delivery of Abnormal Loads	System managing the HA’s responsibilities in dealing with abnormal loads
ESRI		Company with market leading GIS solutions that have been adopted as a standard by the HA
FEP	Front End Processor	A system installed in RCCs to provide caching for Halogen

Abbreviation		Description
FVD	Floating Vehicle Data	Traffic speed and journey time information collected from GPS equipped vehicles, often through Sat Nav equipment
GIS	Geographic Information Systems	Systems and applications for displaying and manipulating geographic information
GSI	Government Secure Intranet	The central government network for managing secure access to e-mail and other services
GSM	Global Standards for Mobile Communications	Used a generic term for data communications over the mobile telephone network.
HA	Highways Agency	An executive agency of the UK Department of Transport tasked with managing the SRN
HABIT	HA Business Information Technology	The general term for all of the non-operational software and systems, such as e-mail and office software
HACCTV	HA CCTV	Web enabled access to cameras and imagery
Halogen	HA Logging Environment	The system providing logging for HATMS, CMDTE and CCTV systems
HANet	HA Net	Public website with HA canera images
HARLiCS	HA Road Lighting Control System	A pilot for controlling lighting systems
HATMS	Highways Agency Traffic Management System	The set of core RCC systems used to sign signs and signals on the network
HAVID		Temporary and mobile CCTV cameras are widely used in road works to monitor safety. They are usually monitored and controlled by Service Providers. The cameras are often fixed but there are also PTZ types. The cameras present to the instation as per normal NRTS connected CCTV cameras via the HAVID system.

Abbreviation		Description
HAWCS	HA Weather Central System	The system collecting weather information from a network of weather stations, other weather systems and forecasters before publishing that information on a website and with web services.
HAWIS	HA Weather Information Service	The internal HA service to collect and deliver weather related information among the HA and its suppliers.
HGS	HATMS Gateway Service	Successor system to the TCCI used by the new NTIS contract
HSM	Hard Shoulder Monitoring	A system that enables semi-automated opening and closing of the hard shoulder using cameras, signs and signals
HVCG	Highways Agency Video Client Gateway	Permissions server for CCTV access
HVACI	Highways Agency Video Client Interface	Device for connecting video clients to the HA's CCTV systems
IAM	Infrastructure Asset Management	The HA's infrastructure asset management suite
ICCS	Integrated Communications Control System	A product from Capita SI that integrates radio, PSTN and VOIP communications in RCCs
IP	Internet Protocol	The basis of the Internet protocols used world wide
KVM	Keyboard Video Mouse	Used to describe a switch that is able to switch the operator keyboard, mouse and video display between different systems
LCC	Local Communications Controller	NMCS2 device that provides switching to legacy devices on the roadside

Abbreviation		Description
Met	Meteorological System	The HATMS systems that processes alert and data received from dedicated weather stations to generate appropriate signal and VMS settings, such as “Fog” when visibility is low
MIDAS	Motorway Incident Detection and Automatic Signalling	A HATMS subsystem that processes alerts received from outstations on traffic flow, speed and presence It then determines appropriate signal and VMS outputs to implement a number of operational regimes, such as Controlled Motorways and Queue Protection
MMCALO	Managed Motorways Calibration and Optimisation	A tool for calculating the optimum configuration of MIDAS Outstations
MNSO	MidNight Switch Off	A project, and systems, to switch off lighting during quiet periods on motorways
MORLiCS	MIDAS Operated Road Lightings Control System	A system for re-instating lighting when traffic flows exceed configured parameters
MSS	Message Sign Subsystem	The HATMS subsystem that manages roadside VMS and arbitrates between requests based on business rules.
NFDB	National Faults Database	A systems to allow manual reporting of faults with RCC systems and data
NMCS2	National Motorway Communications System 2	The set of specifications for systems and protocols used by HATMS
NRTS	National Roads Telecommunications Services	A service contract that provides all of the operational telecommunications for the HA
NRTS II	National Roads Telecommunications Services II	The successor contract to NRTS. The set of services is changing and there may be changes to protocols
NSPIS	National Standard for Police Information Systems	A system promoted as a national police standard

Abbreviation		Description
NTCC	National Traffic Control Centre	Predecessor to the current NTIS contract
NTIS	National Traffic Information Service	A service contract providing traffic and travel information nationally on behalf of the HA
NTOC	National Traffic Operations Centre	The control centre for national operations under NTIS
NTP	Network Time Protocol	An extensively used protocol to distribute time synchronisation to systems on a network
NVRM	National Vehicle recovery Manager	A contract used to recover abandoned vehicles from the motorway network, generally into secure compounds.
NW AID	North West Automatic Incident Detection	A pilot project using video analysis to detect incidents
OCD	Operational Context Description	Document under J-STD-016 describing the environment in which the system or application will operate
OIF	Operator InterFace	Used within the HA to denote the HATMS operator workstation
PEW	Permit for Engineering Work	A system to manage the process of requesting permission to carry out engineering work in the RCCs.
PNC	Police National Computer	A central database of information held by the police nationally. The HA has permission to retrieve limited information on vehicles.
PNG	Portable Network Graphic	A file format used to hold images
PQQ	Pre-Qualification Questionnaire	A document completed by bidding suppliers as part of a procurement to select a short list of bidders for the next stage.

Abbreviation		Description
PSTN	Public Switched Telephone Network	The general public telephone service, including those on mobile networks
PTZ	Pan Tilt Zoom	The three axis of movement for cameras. Generally used to refer to any controllable camera, and may also include controls for the iris and focus settings, as well as wiper controls.
RCC	Regional Control Centre	An HA traffic management centre covering an HA region, generally aligned with Government regions
RIF	Roads Information Framework	An application to combine data extracted from a number of HA sources, including the C&C incident log to present a view of the SRN
ROAMSS	Remote Open Access Message Setting System	A means of setting VMS through a dedicated interface to the MSS subsystem
RTMC	Roadside Technology Maintenance Contractor	See TechMAC
RWS	Rijkswaterstaat	Netherlands ministry dealing with the road network
SaaS	Software as a Service	Software accessed over the internet and hosted by the supplier
SCADA	Supervisory Control And Data Acquisition	System for managing remote devices over a network
SOoC	Senior Officer on Call	The Gold Commander in the HA's incident management escalation plan
SRN	Strategic Roads Network	Motorways and other roads defined as being of strategic importance
TAME	Traffic Appraisal Modelling & Economics	Originally the name of a project to install a set of traffic measurement devices on the SRN to provide consistent measurement of traffic for the Department of Transport, it has now come to denote the measurement devices.

Abbreviation		Description
TCCI	Traffic Control Centre Interface	A subsystem, part of HATMS, that interfaces to the NTOC systems providing information about signals and signs, and providing the ability to set VMS
TCP	Transmission Control Protocol	A standard internet protocol used extensively in networks
TechMAC	Technology Maintenance Contractor	One of the organisations that maintains the roadside devices and provides first line support for RCC systems. The contracts are changing and the new role is called RTMC
TMC	Traffic Management Centre	A term encompassing all of the centres involved in managing traffic on the network, including both RCCs and NTOC
TMU	Traffic Monitoring unit	A roadside device, based on the MIDAS Outstation, used to measure traffic flows and speeds
TPMS	Technology Performance Management Service	The contract and set of systems used to manage faults in roadside systems.
TRL	Transport Research Laboratory	Private company providing expertise and support for transport issues
TTC	Telephone Text Controller	A systems for initiating simple exchanges with the ERTs, including PSTN phones on APTR roads, allowing non-English speakers and the deaf to use ERTs
TVBS	TV Base Station	A systems used in RCCs to manage and control cameras through NRTS
TVBS WOIF	TVBS Windows Operator Interface	The user workstations connected to the TVBS to control cameras
UTMC	Urban Traffic Management Centre	A system used to manage a wide variety of devices and applications in urban environments. Used by the HA to manage traffic signals on roundabouts over motorway junctions

Abbreviation		Description
VMS	Variable Message Sign	A sign that can be set electronically to display different messages and pictograms. A variety of technologies is used including rotating planks and LED displays
WRF1	Winter Reporting Form 1	A system that allows electronic reporting of information such as salt stocks and spreading routes.

Appendix A. Glossary

Term	Definition
System *(software system)*	A logical entity that could be comprised of extant applications as-is, enhancements to existing applications, new applications, shared components/common services between multiple systems or any combination thereof.
Key Performance Indicator *(KPI)*	a Performance Measure for which performance below the Target Service Level leads to the accrual of Service Points by the Service Provider
Traffic officer *(road inspector)*	A person (operating from a roadside locations) that liaise with the police commander at scene to establish the details of when any closed carriageways or lanes will reopen and when other specialist resources are required to be deployed.
Traffic Management Centre Supervisor *(supervisor)*	A person responsible for (non-limiting listing): 1. Allocation of roles to Regional Control Centre Operators at the start of each shift; 2. Management of day to day operations of a team of Traffic Operators in a Regional Traffic Management Centre; 3. Coordinating execution of Fail-over and Load sharing actions; 4. Brief and debrief of Regional Traffic Management Centre Operators; 5. Management and decision making for escalated incidents.
Common Highways Agency Rijkswaterstaat Model *(CHARM)*	A Programme of cooperation between the Highways Agency and Rijkswaterstaat to define, with a view to jointly procure a new generation of traffic management systems.
application service *(service)*	A self-contained unit of functionality offered by the system
Capability	A set of related functions, processes and application services that the ATMS system needs to offer to deliver the business objectives
Highways Agency Traffic Management System *(HATMS)*	A set of systems used in the Agency's Regional Control Centres to undertake traffic and incident management activity using signs and signals.
HATMS Gateway Service	A specialist application that interfaces between HATMS and NTIS
Traffic Management Unit *(TMU)*	A system, used by the Agency's NTCC, comprising of loops to collect Traffic Data.
Strategic Road Network *(SRN)*	All roads maintained and operated by the agencies

Term	Definition
sign	an instruction for dynamic travellers having a conventional meaning and used in place of words
Event	an occurrence located on or off the SRN with the potential to have a Material Effect on the SRN; Events include Current Events and Forecast Events
log	an official record of events, usually including a time stamp, the events may relate to system events (system log) or traffic events, i.e. incidents (action log)
Operator	general classification for the internal user of the ATMS, responsible for one or more regions, roads and/or processes and a person who works in traffic control centre and is responsible for accessing updated information related to traffic to assess strategic response required, setting strategic signs and signals e.g. National Traffic Operator, Regional Traffic Operator,
Fault Management System *(FMS)*	Part of the Agency's NTCC Instation; the system for monitoring faults in technology.
Regional Control Centre *(RCC / Regional Traffic Management Centre)*	Regionally based traffic operations control rooms responsible for managing incidents and ensuring the smooth operation of the motorway network and trunk roads.
National Traffic Control Centre *(National Traffic Management Centre / NTCC)*	The Agency's National Traffic Control Centre, which delivers information about network conditions to customers (both road users and within the Agency) through identified delivery channels
traffic control centre *(TCC / TMC / Traffic Management Centre)*	the buildings from which the agencies deliver their traffic management services
infrastructure *(traffic infrastructure)*	the interconnected structural elements that support a society, in our context typically referring to roads, tunnels, bridges and equipment for traffic management, should not be confused with IT infrastructure
National Traffic Operations Centre *(NTOC)*	The location at which centralised operational activity is undertaken in England
Highways Agency *(Agency / HA)*	The organisation responsible for building, maintaining and operating the Strategic Road Network in England
Rijkswaterstaat *(RWS)*	The organisation responsible for building, maintaining and operating the Strategic Road and canal network in the Netherlands

Term	Definition
action	used in the broadest sense possible meaning all activities that may be performed in response to an event including capacity measures, informing someone or providing instructions for someone to do something

Appendix B. Index