Progress Report on the development of the Asset Information Strategy and Asset Register

April 2008

Executive Summary

Network Rail's Asset Information Strategy (AIS) is aimed at identifying solutions that will improve how we support our own needs and the needs of our customers and stakeholders over the next ten years.

For the past three years we have been engaged in an intensive programme of data quality and system functionality improvements. As a result of this work we have reached the stage - - in which:

a. All infrastructure asset disciplines have systems in place that are populated with the core data necessary to support primary decisions on the maintenance and renewal of the infrastructure.

b. Asset Data Management (ADM) procedures have been developed for all disciplines and an assurance regime has been developed and implemented.

c. The Corporate Network Model (CNM), which includes a geospatial representation of the railway infrastructure, has been identified, and is being developed, as the primary mechanism for providing easy and intuitive access to infrastructure information for both internal and external users.

We believe we are now on a par with good practice in UK utility companies and other European railway administrations The challenges faced by Network Rail in meeting the demands of a growing railway with improved outputs at an affordable cost provides further stimulus for the next stage of development in the way we manage our asset information. The first part of this document identifies the strategic priorities for meeting these challenges and describes the technological framework, which will support their delivery. The strategic priorities include:

- Sustaining and further improving the data quality improvements achieved over the past three years;
- Extending the scope of asset information where this is justified by the relative costs and benefits, particularly in the area of asset condition.
- Integrating our systems to provide a single master source of data throughout the company and to enable the cross referencing of data held on different systems.
- Improving user access to asset information, by providing a single point of entry and a range of formats such as reports, geospatial, video.

The second part of document provides an update on progress of the implementation of specific systems and projects, which are currently being undertaken. These current projects and systems are classified into the following four categories:

i. Core strategic asset information systems
ii. Other major integrated solutions
iii. Discrete systems by discipline/programme
iv. Train-borne measurement systems

The major projects described are consistent with, and in fact represent key deliverables in the implementation of, the asset information strategy.

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Introduction

Document purpose

The purpose of this document is to provide an update on the evolving Asset Information Strategy (AIS) for Network Rail, and to report on the progress made with individual systems and projects since the last Progress Report dated 1 October 2007.

Network Rail is continuing to develop its Asset Management Strategy (AMS) which was published as a supporting document to the October 2007 Strategic Business Plan. The AIS supports the delivery of the AMS.

The scope of the AIS is to specify, at a high level:

- the requirements for the collection, storage, maintenance and reporting of the information on Network Rail's assets
- the development plans for the implementation of these requirements

Document audience

This document is issued to ORR in accordance with the requirements of our Network Licence.

The document explains where we have reached in implementing our asset information and identifies the priorities for the next 2-3 years. The document also targets an internal audience within Network Rail and our customers and stakeholders who have increasing requirements for access to infrastructure information. The document is therefore published on our external website.

Document structure

This document has two main components:

a. Firstly, it provides an overview of the current position on the implementation of the asset information strategy and identifies the high level priorities for the next phase of implementation. It also summarises the IM architecture which is being developed to provide the technological framework to underpin the delivery of the strategy.

b. Secondly, this document details progress with implementation of the specific systems and projects which are being undertaken to deliver the broader asset information strategy. These current projects and systems are split into four topics:

   v. Core strategic asset information systems

   vi. Other major integrated solutions

   vii. Discrete systems by discipline/programme

   viii. Train-borne measurement systems

Further development and implementation of the Asset Information Strategy

The Asset Information Strategy has been in place for a number of years and was most recently published in September 2005. The strategy is fundamentally unchanged. The purpose of this section is to re-state the principles underpinning the strategy and to highlight our thinking on how to implement the next major stage of the strategy through a programme of work that will span the next 2-3 years.

MAINTAINING THE STRATEGIC PRINCIPLES

In our original AIS published in 2001, we stated that there are four key principles underpinning our strategy, namely:

- The establishment of Network Rail ownership and control of the data required for the management of the company's asset base
- The availability of sufficient current and historical data on asset and operational performance, to allow optimal fact-based decision-making
- The integration of asset information across Network Rail, to establish a single coherent and consistent view of assets and groups of assets within the network
- The adoption and use of a consistent approach to asset information processes

These principles remain unchanged but are expanded below to reflect lessons learned from work undertaken since they were conceived. In particular, the solution is required to have the following characteristics:

- The means to manage and report on all groups of asset information – static asset data, ownership, condition, renewal projects, faults, inspections and all other maintenance tasks, including history where required
- Coverage of all infrastructure assets
- Integration of data to support the business processes for asset management.
- It must support integrated business processes (i.e. with Operations, Planning, Commercial Property and Finance)
- Presentation of data presented in textual, geospatial and/or schematic forms as appropriate
- Processes and procedures to underpin the maintenance of data quality processes
- Accessibility of asset information to a wide range of users inside and outside Network Rail
- Configuration management to ensure that our asset records reflect reality and are always changed consistently. In particular, a data item must have only one master source so that the same data item is seen and used at all places throughout the company.

CURRENT POSITION

Our priority over the last 2-3 years has been to undertake and complete a major programme of work specified in a set of Asset Register Guidelines which we developed with, and were published by, ORR in November 2005.

The guidelines specified a series of tasks including the systematic specification of information requirements leading to a series of data quality and system functionality

improvements. In parallel, asset data maintenance procedures and an information assurance regime were implemented to secure the data quality improvements going forward. The requirements for access to asset information by our customers and stakeholders were also a major consideration in the specification of data requirements and the system functionality improvements.

The work was completed in September 2007 in accordance with the timescales in the guidelines. It was acknowledged, at the time the guidelines were published, that there were major gaps in the coverage and quality of asset information necessary to support primary decisions on the maintenance and renewal of the infrastructure. In addition, the processes and procedures for maintaining and assuring data quality were not fully defined or complied with. Access to information by Network Rail staff and external stakeholders was also complicated by the plethora of systems on which the data was held.

The current position is that:

d. All infrastructure asset disciplines have systems in place that are populated with the core data necessary to support primary decisions on the maintenance and renewal of the infrastructure.

e. Asset Data Management (ADM) procedures have been developed for all disciplines and an assurance regime has been developed and implemented.

f. The Corporate Network Model (CNM), which includes a geospatial representation of the railway infrastructure, has been identified and is being developed, as the primary mechanism for providing easy and intuitive access to infrastructure information for both internal and external users.

We now believe that we have reached a position where the quality, coverage and accessibility of asset information are on a par with good practice in UK utility companies and European railway administrations. This assertion is based on benchmarking and other exchanges with railway infrastructure owner/managers in Europe and the contacts we have with utility companies through the Institute of Asset Management.

Our objective going forward is to strive towards best practice in the management of asset information. We believe this is appropriate, being one of the largest asset management companies in the UK that is responding to the major challenge of improving outputs in the face of growing demand for services and an unrelenting demand for cost efficiencies.

A number of potential improvements, which will contribute to this objective, have been identified through recommendations arising from vision development and audits undertaken by the Independent Reporter for asset management, currently AMCL. In addition, we are continually identifying improvement opportunities to meet the changing needs of the business, a number of which are identified in the next section.

OPPORTUNITIES FOR IMPROVEMENT

A number of emerging issues is summarised below to illustrate how developments in the management of asset information could further improve the decisions we take on maintaining, renewing and enhancing within a framework of minimising whole life, whole system costs.

Delays caused by infrastructure failures

We will considerably improve the detailed analysis of delays caused by infrastructure reasons by improving the link between train delay data held in TRUST and our asset

registers. This would help identify asset types, and even individual assets, which require changes to their maintenance regime.

Failures and asset data

Similarly, we will improve the detailed analysis of asset failures by creating a link between our work management tool (Ellipse) and our asset registers which hold asset data such as location, condition, type etc. This will allow improved verification of the asset policies.

Reliability

When we are able to link failures, asset data and utilisation, we will be able to readily calculate an accurate Mean Time Between Failure (MTBF) for many assets. This will allow us to re-calculate the MTBF easily and thus quickly identify (for instance) issues with new asset types introduced to service, without relying on individuals to spot and action such issues.

Local databases

Integrated national systems with master data will reduce maintenance effort and make locally-held information more widely available. This information is often held on local databases (using MS Access) and spreadsheets (using MS Excel). These local systems tend to be maintained better than the national systems but, being local, the data on them differs to some extent. Thus, the full national picture is currently not available to anyone without extensive analysis.

Interfacing between systems

Many of the older systems within Network Rail hinder or even preclude any direct interfacing, either by virtue of the particular design and non-standard data structures, or else due to them being proprietary systems run by contractors. Consequently, these older systems are either very difficult (hence expensive) or even impossible to link to the newer systems.

Consistent data

We will improve and enforce data standards. This would simplify data analysis, improve data quality and reduce the cost of future IT systems. This is especially important in respect of location data which is the means of achieving commonality between data sets. Currently, data cannot be readily transferred between systems and data is thus only available to the users of each individual system. An improved data dictionary is needed, together with a business process which enforces its use.

Analysis issues

We will simplify our data analysis processes so that more people can use the same data and get the same answer more easily. A manual exercise of linking fault data from FMS with delay data from TRUST took many months and still allowed errors in interpretation. Running the subsequent calculations on the data took many days. To download the data again would require a complete re-run of this process. This sort of analysis should be automatically achievable with a few minutes effort.

STRATEGIC PRIORITIES

The opportunities identified within the business, together with our improved understanding of external stakeholder requirements and the recommendations from the Independent Reporter have, lead us to a set of strategic priorities which will direct our asset information improvement programme over the next 2-3 years. The priorities are explained under the four following headings.

Sustaining data quality

It is imperative that the hard won gains in data quality achieved since 2005 are sustained and further improved to meet increasing demands. This will involve the deeper embedding of the asset data maintenance procedures across the business, particularly relating to the updating of our systems following modification or renewal of assets. We will reinforce these procedures by reporting on renewals directly from the asset register rather than by a parallel process which has been the expedient option to date. We also recognise the need to extend our information assurance regime to include physical checks of assets on the ground against corresponding data held in systems.

Technology improvements will also play a key role, providing data validation on entry and automating the updating of our systems using, for example, hand held devices.

Extending the scope of asset information

We need to manage the balance between the expanding requirements for asset information to meet increasing demands with the costs of acquiring and maintaining asset data. We now have most of the asset data we need to support our primary decisions. However, there is the potential to significantly improve certain decisions by extending the scope of asset information we collect, particularly on the condition of assets.

The possibility of acquiring such data has been enabled by developments, for example, in the technology supporting automated train borne measurements and the remote conditioning of assets. Such data will contribute to the further development and justification of our asset policies and the realisation of the move to 'predict and prevent' which the policies will direct.

Integrating data held in different systems

We have over the past two years reduced the number of core systems holding asset information. There remains however some duplication of data, e.g. held separately on asset registers and in work management systems. The cross-referencing and aggregation of data held in the various systems can be complex and require a high degree of expertise.

The strategic priority is to further consolidate the number asset information systems build linkages between our systems that will remain. This will provide the basis for a single point of data entry and prevent situations in which different data on the same asset is held in different systems. It will also enable the cross-referencing of data which may be held on different systems for good reason, for example asset failures and train performance.

Improving user access

The integration of data referred to above creates the foundation for revolutionising the way by which our own people and our customers and stakeholders are able to access information about the infrastructure. The strategic priority in this area is to provide a single point of user access to a wide range of infrastructure information. Our intention is provide a range of data formats, matched to user requirements, for example, textual reports and, increasingly, visualisation through geospatial or schematic displays.

Examples and benefits

Specific examples are provided below of how the next stage of implementation of the asset information will lead to improved asset management decision making.

- Including all groups of asset information within a single discipline will make it possible to identify links of cause and effect (e.g. rail defects related to poor track geometry or wet beds)

- Linking the infrastructure assets of all engineering disciplines will enable cross-disciplinary analysis, such as identifying more complex links of cause and effect (e.g. faults with OHLE caused by poor track geometry, or track faults related to the presence of structures such as drains)
- Establishing a single point of access to information for all users will facilitate more joined up planning of work, particularly where there is a potential overlap between maintenance, renewal and enhancements.
- Linking processes across functions will permit improved linking of (for example) specific asset failures to delay minutes, assets to costs and faults/renewal tasks to possessions
- Clarifying the contractual responsibility for maintenance, repair and renewal of various assets will avoid expenditure where responsibility lies with other parties
- Presenting in geospatial and schematic forms (as well as textual), it will be possible to view a map or schematic diagram, find a specific asset and then see all the details of that asset and co-located assets with links to reports and photographs
- Using schematics of the railway, will be able engineers to see at a glance the quality of the infrastructure in their areas of responsibility, obtain more detailed information where things are not right and thereby make more informed decisions about what rectification actions are required
- Combining infrastructure data with that for logistics and workforce will enable supply chain and contingent labour costs to be reduced through more effective materials and resource planning

THE STRATEGIC ARCHITECTURE

The vision for asset information will require the development of a modern IT architecture, as many of our current systems have reached the limit of their development. This strategic architecture will help us to identify and implement components which will enable significant improvements in the scope, detail and accessibility of our asset information.

High-level solution

The high-level solution is that all the separate asset databases will be seen by the user to act as a single database. To achieve this, all asset information systems will conform to a common standard, using a user interface with a common look and feel, as well as a common data model and common data standards. The data on these separate systems will be linked together (where required) and data will be synchronized between systems so that there is only one version of any item of data. This solution requires that:

- Every data item is designated as master data or as copy data
- All master data is updated through automatic processes or a single manual process
- Copy data is synchronised across all systems by an automatic process, not by human intervention

In addition, data will be displayed, as required, both geospatially (as a map) and schematically (as diagrams). All assets will be visible on these displays, according to user choice, and it will be possible to view the corresponding asset data on the same screen or to link from the asset to another screen to display that data (including documents, photographs and even video if required).

Most users will only use the geospatial and schematic views, together with the appropriate reporting data mart(s). The update function and the reporting function will be compatible web-based applications operating through the Network Rail portal. This makes the functionality readily accessible across Network Rail, and provides the desired common user interface.

Solution features

This high level strategic solution for asset information has the following features which need to be incorporated in the design of each part of the solution as appropriate:

- Easy to use
  - Intuitive interface
  - All screens, reports and interface with a common look and feel
- Enterprise-wide
  - Integrated across all functions
  - Supporting one version of the truth
  - End-to-end business processes
- Available and accessible
  - Right information available in a timely fashion
  - User access to the appropriate functionality based on user role
  - Comprehensive standard toolset for analysis and reporting available for all users coupled with specialist ad-hoc reporting
  - Reporting tools capable of drilling down to any reportable unit
- Good data management
  - Global data held once as master and not duplicated
  - Global data standards enforced
  - All information groups (e.g. faults, condition, inspections) linked across each asset discipline
  - Assets linked across each functional area by location
  - Validation on entry for all new data wherever possible
  - Migrated historical data available for analysis and reporting
- Flexible and extensible
  - Responsive to business change
  - Capable of being supported and amended internally by Network Rail
  - Allowing future state modelling
- Modular
  - Flexible, re-useable components
  - Reduction in overall cost

High level architecture

To meet the above requirements and provide a sound basis for the our asset information requirements for the future, an outline schematic structure of the proposed high level architecture has been devised. This is shown in Figure 1 below.

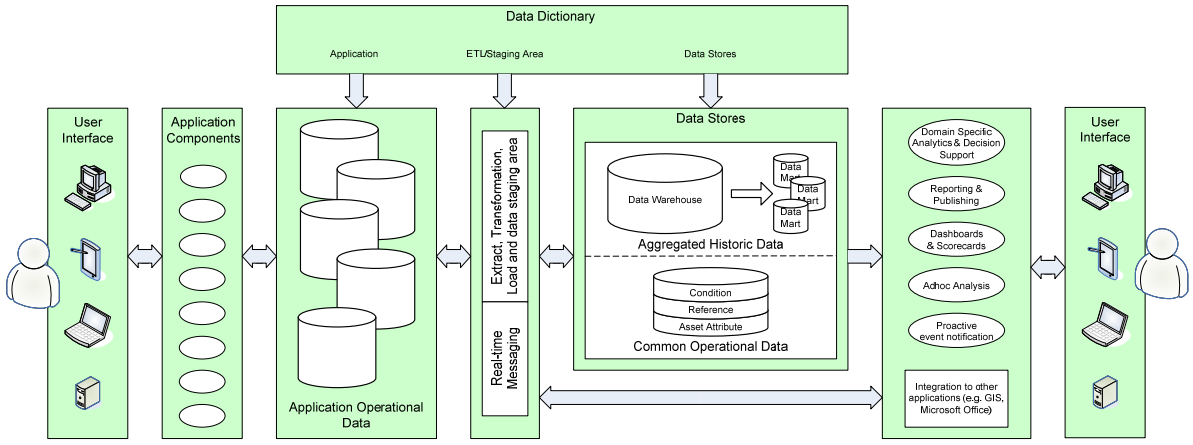

Figure 1 - High Level Architecture

The schematic in Figure 1 represents (working from the left) the operational asset data being input and maintained by users. This master data is held in application operational databases and loaded on a regular basis by automatic processes to the data stores. From here, data is extracted into reporting databases for the majority of users to extract information as required.

The data store is the strategic pre-requisite which permits this architecture to replace much of the time-consuming analysis on local databases. The data store will allow for the linking of locational data in geospatial and textual forms; this is the critical core which enables this architecture to meet the solution requirements and to demonstrate the characteristics above. Once constructed, the data store permits a gradual implementation of change as each existing operational data store is brought to the right standard. This therefore presents a lower risk than other options.

In order to provide consistent data, the data store must only hold one instance of each asset and one current value for each item of asset information. It is therefore a pre-requisite of this architecture that the operational data stores must be aligned with each other and only utilise this master data, not their own values. This is done by identifying the master source of each item of data, storing this in the data store, and making all other systems read that value from the data store. This avoids the need for those systems to interface with each other.

Data stores

The data store is split into two parts: data is primarily held in the Common Data Store (CDS) but common operational data is held separately to the CDS. This is because it is updated in real time whereas the CDS is updated regularly (e.g. overnight). The CDS in Figure 1 is essentially a data warehouse (DW), supported by data marts (DMs).

The distinguishing feature of a DW is that it has a single database of a design which is optimised for reporting. The DW holds a single transformed copy of the data from each of the existing in-use systems, where the master data is still updated by users. The business data stored in the DW is routinely transferred to a number of DMs, each of which is designed for specific aspects of analysis and reporting. Each DM holds exactly the right data, aggregated as required, in the most suitable form for the particular user group or particular type of reporting and analysis. Separate business functions are then able to interrogate the data they require from their own DM. Update of data can only take place on the original database, not on either the DW or the DMs.

The DW/DM architecture is a more flexible means of reporting than using the source database because it is easier to modify the DM than the source system. Moreover, the user only has to be familiar with a single reporting tool, regardless of where data is input, and that tool has a more convenient data structure for reporting which is easier to understand and more efficient in use. Always accessing just one DM is especially beneficial to infrequent users who would have difficulty maintaining sufficient expertise on a large number of corresponding individual systems.

The architecture for asset information applications

We have already begun to develop strategic projects to deliver a series of reusable information service components to make up the overall asset information architecture. The modular design of these components will facilitate their reusability and help to reduce the total cost of realising the vision, and ensure that individual parts of our asset information architecture can communicate more readily with one other. We will achieve this as follows:

a. The need for compatibility with the strategic vision will be included in the requirements of all new projects.

b. The strategic architecture will be clear and detailed enough to permit all new systems to comply with the strategy. The core of the architecture is the Common Data Store and this will require to be developed as a separate enabling project in order to provide a sound foundation.

c. The specific projects which are required to be initiated to deliver this strategy will need to be determined and prioritised These need to be identified for delivery as part of a single programme whose aim is to facilitate the delivery of the AIS across the company.

As this architecture has been evolving until now on an ad-hoc basis, some projects have already been designed from the outset to comply with this strategy, and therefore will be able to be incorporated in the strategic programmes of work.

Over a period of time this approach will yield a comprehensive integrated solution, with lower risk and cost than other options. This has given us a head-start but this policy needs to be extended to include the systems sponsored elsewhere in the business. A strength of this approach is that it can be implemented in many incremental steps, as a set of building blocks.

Network Rail has embarked on a programme of introducing Enterprise Architecture as a governing framework for Information Management. We are using these methods, techniques and tools to define, analyse and manage the information application requirements. This approach is proven and many leading companies have adopted it as their strategic tool to successful information management.

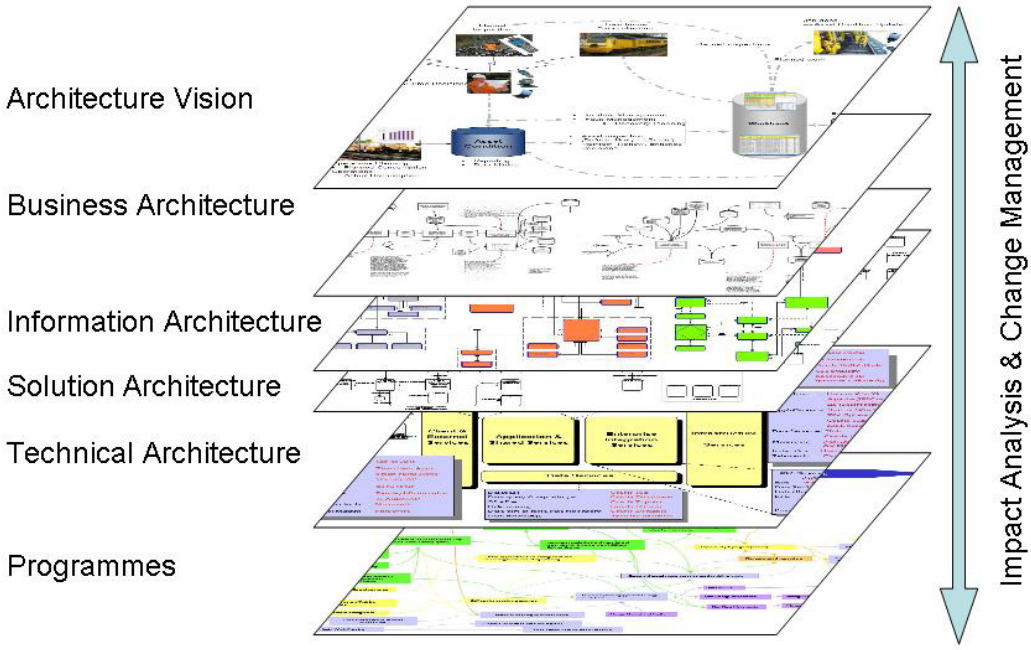

Figure 2 - Proposed Architectural Layers

Figure 2 shows how the vision relates to the solution through a number of different architecture objects or layers (Business, Information, Solution, Technical) of the framework. The arrow on the right represents the explicit links between the different layers which ensure consistency and integrity of applications from the vision to the eventual solution and ongoing management. These links are 2-way so that the impacts and management of change can be investigated at any level and between all levels.

Enterprise Architecture together with our modular development approach will take us further towards a service based information management environment managed by the different architecture components.

This will support a move away from stand-alone applications towards having a range of services to support business processes. This in turn leads to greater flexibility of these services to meet new requirements, greater standardisation on technologies reducing the need for support and an improvement in data quality by the use of a common data model and controlled sharing of data.

We have a wide range of applications in use within Network Rail. The issue to be faced is how this collection of different systems can be made to function together in order to realise the business strategic vision.

Programme development

A programme for the development of the strategic architecture is the first new initiative that we will progress to move the AIS forward. We will address the feasibility of this as a priority in 2008, and this initiative will consider in detail topics such as:

- Master Data Management
- Data Dictionary
- Common Data Store
- Configuration Management
- Corporate Data Model
- Corporate Governance
- Agile Development
- Business Processes & Standards
- Reporting at local and national levels
- Business Change Management
- Service Oriented Architecture

We will clarify the requirement for future projects for asset information systems, and address any gaps in the current range of systems in use and under development. These system gaps cannot be fully identified until the AIS has been developed to a further level of detail.

We will review the function and purpose of the in-use systems, and consider their status as part of this strategy. Some of these systems were delivered a long time ago and their purpose has evolved over time; even those more recently delivered were justified on an individual cost-benefit basis which was often based on a system view rather than a strategic requirements view.

Progress with current projects

This final section of the update details progress with implementation of the principal systems and projects which are being undertaken or planned to deliver the broader asset information strategy in accordance with the high level strategy detailed above. It describes initiatives to increase the availability and improve the timeliness of asset information, and the development of systems and tools to make this information widely accessible.

Many of these projects and workstreams were initiated before the development of this strategy. The challenge which they present is to ensure that they conform to the strategy and contribute to the development of the integrated information system described in the vision.

This section is split into four parts:

- Core strategic asset information systems
- Discrete systems by discipline
- Cross-functional systems
- On-board measurement systems

CORE ASSET INFORMATION SYSTEMS

This section describes the systems/projects which are regarded as the core of the strategic corporate solution:

- Corporate Network Model (CNM) which presents data geospatially
- Track Asset Systems Replacement (TASR) which is designing the replacement system for GEOGIS data
- Ellipse which holds work management data

CNM and TASR are being developed together so that a single network model is used for both, enabling track asset information to be displayed geospatially. These strategic systems will be linked together by using the Central Asset Inventory (CAI).

Ellipse is also regarded as a core system of great importance but development of resource planning and management is constrained by having two enterprise resource planning tools. Provision has been made in CP4 for the integration of the functions performed by Ellipse with Oracle e-business or migration of these functions to an Oracle module Enterprise Asset Management (EAM). A study is underway to identify the likely issues and to make a preliminary recommendation on the preferred direction

The development of this core of systems is a major step forward in implementing the strategy already described, and the CAI will be the means for linking to other asset systems to permit geospatial display of asset data for other disciplines. In fact, the strategic principles described in this document were first conceived and developed by the architects of those systems; this strategy is a formalisation of their vision which is only possible because of the achieved deliverables of those projects.

Corporate Network Model

The Corporate Network Model (CNM) has the capability to integrate operational, engineering and commercial representations of the network, and align primary information sets, geographically. It is a key component of our asset information strategy.

To manage the growing requirement for geospatial information applications, the CNM Development Programme was instigated in October 2007. The programme is driven by an overarching 'vision route map' supported by a rolling programme of cross-functional projects. The projects currently planned or underway are aimed at delivering core foundation applications and high-priority business information in web-enabled geospatial formats. Subsequent to this, a number of new projects have also planned for the short and medium term to capitalise on the core projects.

The work currently in progress in this programme is as follows:

Network model merge

This pivotal project will produce a unified track level network model which geospatially integrates the current different models for operations geography and engineering geography, providing for the first time a single, maintainable view of the national network across business functions.

A considerable data cleansing exercise has been completed in preparation for the next phase. The merge with the Integrated Train Planning System (ITPS) model will be completed by August 2008, together with an automated update facility to keep the ITPS system aligned.

Train mapping

This project is designing a train mapping application to trace individual train movements at track level. A core output of this design will be integration with a central Train Operations Data Store (TODS), which will warehouse a single version of train-running information. A key application feeding from the TODS is the Complete Traffic Data System (CTDS), which is being delivered as part of the CNM development programme. It will provide the capability to aggregate and monitor tonnage, capacity and wear information and allow trended analysis of track utilisation to be viewed against parallel business information, e.g. maintenance inspection setting, infrastructure capability publication and infrastructure cost modelling. The train mapping project has now completed its initial design stage and will be developed during the period to December 2008. The scope of the programme allows the project to be run in close co-operation with the development of other applications that will utilise the train mapping capability enabled by CNM. Prominent among these are initiatives in track access billing, and improved delay attribution.

Schematic diagram

This project is designing an in-house schematic diagram which can be produced directly from the geospatial model. This will reduce current supply costs and increase the currency of information, and could provide the basis for the publication of a range of asset and capability information. Since the project start, we have confirmed the business requirements, investigated data sources and started the solution design. In the next six months, we will produce a detailed solution design, and capture and load the associated data layers. This project is due to complete in December 2008.

Layers

The implementation, by August 2008, of a range of primary information 'layers' that will enable data sets to be viewed and manipulated in a geographic context:

- Infrastructure capability – completed January 2008
- Track geometry
- A 'Digital River' network map – completed December 2007
- Signal interlocking boundaries
- Mechanised maintenance

- Buried services utilities

Master Map

Master Map, the latest Ordnance Survey aerial imaging product, will be integrated with CNM by May 2008.

Access by external stakeholders

Access to key capability information by external stakeholders; following lessons learned with trial provision to the ORR, a new project will deliver the technical capability for external access in April 2008.

Signal register

This will provide a definitive signal register that draws together records from existing sources and maps them to the unified track model. This is a key enabling activity for a number of business-wide initiatives, particularly the ability to map train movements to the network. To be implemented in parallel with CTDS by December 2008.

User interface

Technology development provides the opportunity to enhance the user experience of Network Rail's geospatial interface. This project, planned for 2009, will assess the merits of available packages and put in place the enhancements necessary to keep the corporate geospatial information solution at the forefront of technology.

Future plans

Other applications to exploit the train mapping capability are also planned across Network Rail functions to support business planning, access billing, and delay attribution.

Beyond 2009/2010, the route map for the CNM development programme incorporates a broad view of enhancements to information provision alongside innovative technological developments. The continuing aim of the programme is to develop the fast-changing capabilities of geospatial information technology to the benefit of the railway network.

Track Asset Systems Replacement

The Track Asset Systems Replacement (TASR) project was started in 2006 to explore the future of GEOGIS; to review how data is held, and identify a solution for a replacement. GEOGIS is a major asset system which contains the data representing the core asset register for track and structures.

The feasibility phase of the TASR project was successfully completed in March 2007, and currently the project is in the design phase which started in May 2007. Completion date of this phase is currently scheduled for August 2008 with the main outputs being:

- As-is and to-be process maps for business processes that involve GEOGIS
- Detailed requirements for the new system
- A system design for the proposed system
- Initial plans for the development, testing and implementation of the system
- Removal of redundant GEOGIS components and menu items

The Outline Solution Design (OSD) was approved on 27 July 2007 and a first draft of the Detailed System Design (DSD) is due in June 2008.

At the end of the design phase the TASR project will move (subject to stakeholder sign-off and investment approval) into the implementation phase of the Track Data Management System (TDMS) for which planning is currently at an early stage. This final phase will

include writing code, screen production, testing plans; user training and full roll-out of the new system. Archiving and removal of GEOGIS will complete the Implementation Phase in late 2009.

In the meantime, GEOGIS is still a business critical system which will continue to be maintained. Activation of CARRS and OPAS together with other data repositories has rendered the Structures capability of Geogis largely redundant. The TASR project will complete work to rationalise logins and remove redundant components and menu items (including Structures functionality) by the end of March 2008.

Data quality work is on-going and the asset data maintenance (ADM) process is continually reviewed to ensure that data is kept up to date in a timely and accurate manner. Communication on TASR progress is updated through a regularly updated website where users are reminded of the need for quality data to be transferred into TDMS.

Central Asset Inventory

The Central Asset Inventory (CAI) is a vital component of the underlying solution for the asset information strategy. Essentially, CAI is a database which provides a means of linking between records held in different systems and thereby enables separate systems to operate in conjunction with each other.

To do this, it provides the means by which records in different databases can be joined together, enabling the various attributes to be collected from different sources, giving a single master set of data for each asset. This allows for the continued use of individual systems with their own databases and so avoids the need for a massive single database.

The CAI database and the components to make this process work were delivered by the CAI project in 2007 to support Civils data on CARRS (see below), and it will also form part of the solution for the GEOGIS replacement (see “TASR” above). It is intended that CAI will be developed to form the basis of the means by which the asset data for all strategic systems, existing or new, can be integrated.

Ellipse

Ellipse is used for the planning and recording of works management within the Infrastructure Maintenance function, and is:

- the means in which the company will demonstrate its ability to plan and carry out infrastructure maintenance activities to time and laid down frequencies
- the means to instruct our Infrastructure Maintenance staff to carry out both scheduled and identified work arising activities on the infrastructure
- classified as the company’s asset register for signalling and E&P assets

Over the years, the company has put a lot of emphasis on ensuring that Ellipse was fully embedded in and understood by the business. The quality of data within Ellipse has also been made a high priority. This has been measured internally and has shown an ongoing continual improvement.

Over the last financial year, the following developments have been enacted:

Description	Reason / Purpose	Current Status	Next Steps
Re-configure **E&P** asset structure	It was accepted that the original population of the system had been applied inconsistently across the Network.	This was a major undertaking and resulted in excess of 200,000 assets being reconfigured in line with agreed, documented design principles. Successfully completed, September 2007	Finalise a few of the asset categories associated attribute population. Apply Maintenance Standard Tasks (MSTs).
Configure and invoke the **conditioning monitoring module** for OLE assets	To capture OLE asset condition information data	The module was fully tested and successfully opened up for use in September 2007. The module was configured to meet the requirements of the E&P Engineers and sufficient reporting capability was created.	E&P Engineers are currently piloting this new solution and capturing and entering real data. Consideration will be given now to extending this to other assets.
Add standardised **ultrasonic** inspections capability	This was an item of Infrastructure Maintenance activity that had not been previously created in Ellipse	Designed and successfully implemented in May 2007	Complete
Add standardised **boundary (fencing)** inspections, including risk rating scoring	This was an item of Infrastructure Maintenance activity that had not been previously created in Ellipse	Designed and successfully implemented in June 2007	Complete
Add standardised **telecoms** inspections capability	It was recognised that some Areas were already in-sourced, i.e. Lancs & Cumbria, East Midlands, Scotland – Fixed Telecom Network (FTN) and SE Territory – predominantly Cab Secure Radio (CSR). These Areas were still utilising ex-legacy systems. There is an intent to in-source all other telecoms by April 2009.	The designs have been agreed and at present data population is being carried out, with the expectation that all currently in-sourced parts of the business will be carrying out their telecoms maintenance utilising Ellipse by March 2008. These agreed designs will aid the facilitation of future in-sourcing.	Virtually complete and expected to be done by the original planned timescales.

System re-alignment to reflect **business organisation hierarchy changes**	Ellipse needed to be re-aligned to ensure that business organisation changes are correctly reflected, i.e. merger of West Anglia and Great Eastern, merger of Liverpool and Manchester and Great Western boundary changes.	These were all carried out successfully and by the short lead times that the business demanded.	Complete
Deploy **Handheld solution to Level Crossing Inspectors**	Provide Level Crossing inspectors with a mobile means to conduct works management, (receive and close works orders) plus a separate script that facilitates the capturing of site investigation information	Full deployment to about 120 Level Crossing inspectors was successfully achieved by January 2008 and these are now in production	Complete
Deploy **Handheld solution to Track Section Managers, Ultrasonic Inspectors and Fencing Inspectors**	Following usage by signalling maintenance staff and level crossing inspectors this was to start deploying handheld functionality into the Track discipline	Decision taken to put project on hold in order to carry out strategic review and produce roadmap into technology requirements both in respect of device selection and software utilised	On-hold pending full strategic review of mobile technology solutions for Infrastructure Maintenance staff

There are a number of future Ellipse developments currently being undertaken in order to further improve the business's use of the system and to enable efficiencies and maximise improvement in quality of data capture and recording:

Description	Reason / Purpose	Current Status	Next Steps
Provide **reference data onto mobile devices**	In order to maximise and exploit mobile solutions for frontline staff, provide 'proof of concept' to show how reference documentation can be introduced onto handheld devices	Currently in late development stage with frontline staff being asked to comment on look and feel of 'Red Book' signalling reference document on current handheld device	Finalise "look and feel" and deploy by April 2008. In conjunction with mobile solutions review extension to other documentation

Provide **business intelligence reporting solution** for Infrastructure Maintenance	To provide efficiencies in reporting timescales and presentation. This will also produce an improved means of Productivity and Compliance reporting.	Authorised, in feasibility stage	Need to seek financial authorisation for full implementation with current timescales for completing being December 2008
Extend standardised **telecoms** inspections capability solution to future in-sourced telecoms activity	The company has stated that it intends to in-source further telecoms work in April 2009. This will extend the way of working in Ellipse to those activities.	Working with NR Telecoms Transaction Team in order to apply the design created on a corporate basis	To be carried out by April 2009 to aid the transition of telecoms in-sourcing
Add standardised **vegetation works management** solution	Create and deploy a standardised means of carrying out vegetation management within Ellipse, in line with NR standards	Not yet started	Envisaged completion by March 2009
Add standardised **off-track drainage works management** solution	Create and deploy a standardised means of carrying out off-track drainage works management within Ellipse	Not yet started	Envisaged completion by March 2009

DISCRETE SYSTEMS BY DISCIPLINE

Track

Rail Defects Management System

The Rail Defect Management System (RDMS) will replace the legacy IMC rail defect systems to support a single company-wide rail defect recording process and will supersede the obsolete Raildata system used to consolidate rail defect data to a network level.

The RDMS database will include data on:

- rail defects
- broken rails
- defects in cast crossings
- rolling contact fatigue (RCF)
- derailment hazards at switches (from NR/SP/TRK/053 inspections)

The project will also create a module within the system to support the management of suspected defects arising from ultrasonic indications detected by the ultrasonic test trains. Data on suspected defects will be held as a separate dataset to defects but the interface will allow users to work between suspect management and defects management as linked processes. Additionally, a separate system is being created to hold all results of NR/SP/TRK/053 inspections.

The principle milestones in the project plan for the design, development and implementation of the new system are:

- commence prototyping – May 2007
- completion of system development – March 2008
- commence rollout – May 2008
- completion of rollout to all areas – September 2008

This plan is based on developing the system in Java which will fit with the IM policy for system development. This will allow for the creation of software components that can be used by several applications, enhancing systems integration.

Preparations for roll-out are well advanced. Trainers have been selected and training materials are in preparation. Data analysts are studying the legacy systems and matching data to fields in the new database in preparation for data migration.

Engagement within the business is high. Presentations have been made to all key stakeholder groups, from main board to front-line operators. Prototypes have been made available to all users in Network Rail via the company intranet. The project has publicised the location of the prototypes by website, email, telephone contact and the presentations to stakeholders and actively sought feedback from a wide range of prospective users. The feedback has been captured via the web site and has been used to improve the design.

The next six months will see the:

- completion of the development
- automated system test
- user acceptance testing
- completion of training materials
- commencement of rollout, including user training and migration of data from legacy systems

The timing of the planned roll-out overlaps with the reorganisation announced in December. In order to ensure a smooth change of process it may be necessary to advance or delay certain elements of the roll-out which could impact the planned completion date of September 2008.

Track geometry and position database

In the medium-term, it is intended that all track alignment geometry and gauge clearance information be integrated within a single database. This will support managing track position based on co-ordinate geometry to a fixed survey grid (as implemented on the west coast mainline), and enable the optimisation of route capability for speed, passenger comfort and vehicle size.

Currently, data to support managing track position on the West Coast Mainline is held in a local database (the ATG database). Network gauging positional data, defining to the profile of each lineside structure relative to track position, is held in the National Gauging Database. The National Gauging Database was originally devised and is currently managed externally by a specialist contractor. The data is compatible with just one proprietary analysis software system, provided by the same contractor.

The envisaged integrated track geometry and position database would support:

- maintenance of extremely tight tolerances of track position necessary for Enhanced Permissible Speeds

- provision of survey and design data to directly guide tampers and other on-track machines
- simplification of tamping interventions, and a reduction in their frequency
- potential to maximise service life of track
- efficiency and economics of track renewal
- optimisation of passing clearances and clearances at structures to accommodate longer, wider passenger vehicles, and taller, more angular freight loads
- making of clearance gauging data more widely available, in a variety of formats that can be used with other comparative analysis tools

Many of these benefits are already being realised on the fast lines of the West Coast Mainline. The proposed new database would enable the methodologies to be implemented readily and more widely across the network. At present, other priorities and constraints upon budgets and resources have held back this project. It is intended that this work will progress as other projects are completed, and budget and resource become available.

Tactical interim solutions have been developed for gauging to manage track position at identified 'tight points', in the form of the Tight Clearance Database, and existing and future capability over a section of route in the form of the Gauge Capability Database. The functionality of these, and that of the ATG database, will inform the development of the integrated system.

Track renewals

The Track Renewals Proposal Support System (TRPSS) is a corporate system to support the management of track renewals. For plain line renewals planned for 2009/10 onwards, it has replaced the local spreadsheets and databases that were used historically for track renewal workbank management. (At present, S&C renewals and plain line renewals for earlier years continue to be managed via the manual systems).

Maintenance teams at delivery unit level enter renewals proposals as problem statements into the database. These proposals are then reviewed by engineers at area and territory levels. If the proposal is accepted into the renewals programme the track renewals engineers enter a detailed renewal specification into the database; the renewal specification is then passed, by the system, to the Infrastructure Investment track renewal team for them to plan and deliver the renewal. For each renewal site, the system will give metrics on the quantity and quality of the renewals (in terms of track geometry) for comparison with the specified requirements.

A new development phase (release 3) was authorised at the end of July 2007. This phase will extend the functionality of the system to support renewals proposals for S&C and address requirements arising from the experience gained in using release 2. There is also an intention to provide the facility to attach files to proposals and renewal records. The development will be delivered as a series of incremental releases. The first of these took place in January 2008 and provided a number of enhancements to validation and filters. The next significant modules will be design risk register (planned to be available to users in April) and the ability to handle re-dated renewals more effectively (June 2008). Initial functionality for the input of S&C renewals is expected to be released by September 2008. Completion of release 3 is intended for early 2009.

The facility to attach files to records was intended to be an early upgrade. Detailed design work has determined that the best solution is to store the documents in CCMS (the Corporate Content Management System) and to provide links between TRPSS and CCMS. However, the ability to link the two systems is dependent upon further development work to CCMS, and upon a project to enable access to a range of systems from a single log-on. In

the interim, alternative file sharing arrangements are being established which offer the opportunity to merge the files into CCMS when the other developments are completed.

Another intended early upgrade - to provide enhancements to track geometry reporting - is pending the implementation of enhancements to the Track Geometry Reports system operated by the Engineering Support Centre.

Two significant strategic changes to our information systems have caused us to revise the dates for delivery of TRPSS. (Initially, release 3 was intended for completion in October 2008.) At the end of 2007, we upgraded our corporate database platforms from Oracle 9i to 10g. This impacted on-going development activity. There was also a decision made to adopt specific Java technologies that will provide a more robust framework for further development and systems integration. This required that the development plans for TRPSS be reworked and new developers recruited. Development of TRPSS is now continuing to the revised plan.

Rail welding

The National Welding Database was created to support a single company-wide weld data recording process. Since the last report, it has been rolled out to all Maintenance areas and nearly all legacy systems have been decommissioned.

Boundary records

Network Rail has a responsibility to install and maintain suitable boundary measures to minimise trespass and incursions onto the railway. Historically, the records to support the management of this process were fragmented, being held in various national systems and in local records. In 2006, new functionality was built into Ellipse to enable all records relating to boundary measures to be kept in a single corporate-level system. The use of Ellipse for boundary records was implemented in 13 Maintenance areas between December 2006 and April 2007.

Because of local resource constraints, the three Maintenance areas in London North Eastern have not yet adopted this corporate solution. They are continuing to use legacy systems, with data input being undertaken by the boundary and fencing management teams, rather than the Ellipse teams. It is proposed to strengthen the data input resource in the locations concerned when the planned Maintenance and Engineering restructuring is implemented later this year. Once the reorganisation has taken place, the potential to use Ellipse for boundary records will be reassessed.

Civils

CARRS

The Civil Asset Register and electronic Reporting System (CARRS) was developed as a structures Asset Management system to operate at a national level, allowing Network Rail to replace the multiple local systems currently in operation throughout the territories, thus having a single view of the national structures asset portfolio.

The CARRS system is a work flow system which holds records in a common format (file/folder) providing the ability to schedule and receive updates of examination reports electronically into a supporting document management system and also allow for the electronic sign off of reports that will generate work items which can be exported to the delivery organisation. CARRS is designed to be compatible with CAI (see above).

CARRS Phase 1 was rolled out to all territories between November 2007 and February 2008.

The processes covered in Phase 1 include:

- Assets Listing & Identification
- Examinations
- Evaluation and Management
- Intervention / (Major works / structural maintenance and MP&I interface)

In some cases the functionality of the local databases will not be completely covered by Phase 1 of CARRS and so will be retained until Phase 2.

The proposed scope of CARRS Phase 2 will include the linear assets (i.e. earthworks and drainage), the Risk Based Examinations management tool, incorporation of the Structures Condition Monitoring Index (SCMI) tool and the assessments functionality. It will also include exploiting the identified enhancement opportunities to increase user functionality and preferences.

The development of interfaces with decision support tools, Infrastructure Investment systems for work items, operational traffic restriction data and geospatial maps/data for earthworks are being considered for inclusion. Future work streams may also include external access to the system by engineers, electronic receipt and upload of structural examination and assessment data directly from suppliers.

The feasibility and design stage of Phase 2 is planned to commence in April 2008 with a view for full implementation by April 2010.

CARRS will ensure that asset information is collected and managed consistently and is available at national level to those making key business decisions about civil engineering assets. Following full implementation, CARRS will have replaced all of the structures functionality of GEOGIS, and all remaining local databases and spreadsheets will have been withdrawn.

Operational Property Asset System

The Operational Property Asset System (OPAS) is the national depository for all Operational Property asset data and will be the 'master database' for all stations, light maintenance depots, maintenance delivery units and lineside building assets.

The system is Network Rail's strategic solution for all operational property assets and will provide cradle to grave asset management; centralised depositary for asset data, reporting, strategic business planning, scenario analysis and interfacing with other company systems. The system is web based and will be accessible by authorised third party users.

The initial phase of the data collection exercise concentrated on 80% of Operational Property's maintenance and renewal expenditure and was completed in September 2007. Full data capture commenced in January 2008 and will continue as a 'business as usual' activity in accordance with Network Rail's company standards. The data collection is captured via a handheld and processed in a proprietary asset management software package.

The current system provides for the requirements of an asset register, with limited further functionality. The future programmes will deliver the full functionality, with a target date for substantial completion by September 2008.

Work streams now commencing are:

- The import of other data sources, for example planned preventative maintenance and relevant legacy data

- Delivery of the strategic business planning suite
- Development of the specialist rail vehicle engineering module
- Reviewing and piloting the asbestos module
- Reviewing the interface to the Operational Property Help Desk
- Delivery of the full reporting suite, including generating the Station Stewardship Measure and Depot Condition Score from OPAS as real time dashboard report
- Interfaces with other Network Rail systems
- Implementing the business change, drafting the revised guidelines and developing the training packages
- Developing the specialist modules for gas, water and electricity

Signalling

The major component of the broader asset information strategy for the signalling discipline is provided by the Signalling Tools and Methods Programme (STAMP), which is a programme of work to improve the efficiency of the delivery of signalling renewals. The main thrust of this work is to align tools to the role of individual users, to automate tasks where practical and to reduce the need to exchange asset data between individuals, processes and systems.

Signalling Schemes Asset Data Store (SSADS)

The first phase of SSADS is specifically concerned with improving and managing the asset data used for the signal engineering asset renewal condition assessment and renewal planning processes. This phase entered Implementation in December 2007 with the development contract awarded in January 2008. Completion is planned as to ensure rollout coincides with the commencement of CP4, i.e. April 2009.

The key interfaces to SSADS have been defined as:

- Signalling Infrastructure Condition Assessment (SICA) tool, enhanced to prove an XML interface with SSADS
- Central Asset Inventory (CAI)
- CAPEX Management Planning (CMP) formally known as the Planning Development Framework
- Corporate Content Management System (CCMS) the document store accessed via an adapted Managed Document Service (MDS)
- National Standardisation of Route Lists (NSRL)

In addition to these key interfaces SSADS will encompass within its functionality the Interlocking Data Cards (IDC) and the Signalling Information Services (SIS).

2008 will see the analysis and requirements capture activities under way for the next phase of SSADS the creation of a schemes asset data store to hold the ‘to-be’ view of the railway making handback into maintenance robust, efficient and to time.

Signalling Data Exchange Format

In November 2006 an XML Schema called the Signalling Data Exchange Format (SDEF) was launched to the industry. Since this time developments have been taking place both within and without Network Rail to be able to import and export as SDEF for pure data exchange tasks, thereby removing the need for human intervention, and its inherent introduction of errors.

With SDEF and its secure web site SDEF User Portal Access (SUPA) established the next phase of the development is to see its use extended outside of Network Rail. This will

occur via Network Rail's 'free issue' of Signalling tools to the industry and the exchange via SDEF of the 'intelligence' embedded within documents prepared by Network Rail, e.g. Location Area Plans providing suppliers the opportunity to import directly into their automatic design tools.

Work has commenced via SDEF workshops between Network Rail and the suppliers to coordinate the further extension of SDEF, potentially to become a cross rail asset data exchange format.

Automatic Mapping of the Railway

This will see signalling data in terms of High Definition Video, Route and Track Centre Lines, asset profiling and height data captured for use in the development of signalling schemes, including the building of signal sighting, constructability models, driver route learning and driver simulator models.

The recent upgrade to the Track Recording Unit (TRU) has also seen modifications incorporated to enhance its ability to capture signalling asset data, including High Definition video for use within Signalling Schemes Image Models (SSIM), e.g. for signal sighting and driver route learning.

These TRU modifications coincide with the deployment of the Intelligent Scheme Plan – Scheme (ISP – Scheme) and the need to move towards a 100% capture of signalling assets, with Insulated Rail Joints (IRJs) being the most critical. The re-alignment of the rail focussed cameras has improved the visibility of the IRJs when profiling the raw data into useable signalling asset data. This will also allow STAMP to carry out further proof of concepts into the use of image analysis software, in order to prove the potential to automatically identify the positions of IRJs without the need for human intervention. This Proof of Concept (PoC) will be carried out during 2008.

To augment the capture of signalling asset data from the TRU, PoCs have been carried out to compare varying methods of manually surveying signalling assets whilst mapping the results to those captured from the TRU. The results of these PoCs including recommendations to standardise on the techniques and processes will be published in mid 2008.

Intelligent Scheme Plans

With both ISP – Scheme and ISP – Sketch completing their development cycles, signalling designers will have two new tools as designer aids for use during signalling renewals. With ISP – Sketch being used to drive out the various early scheme options, it is also the first tool to have the capability to export via the SDEF. ISP – Sketch has also been identified as the tool of choice for modular signalling.

The current phase of ISP – Scheme will allow users to semi-automate the production of the base signalling plan using signalling asset data captured from GPS based systems such as TRU. Whilst work has started on the finalisation of the requirements for the next phase of ISP – Scheme which will create a modern design tool for the production of Signalling Scheme Plans and its subsequent child documents, such as aspect sequence charts, location area plans, stageworks plans, etc.

ISP – Scheme will then become integrated with the automatic mapping tools, SSIMs, and be capable of exporting via SDEF allowing suppliers to be able to re-use the intelligence embedded in the Signalling Scheme Plan, e.g. asset data, topology, and scheme design details.

Electrification & Plant (E&P)

The Business Critical Document (BCD) Project, which set out to catalogue and scan 17 types of BCDs, was launched in November 2007.

To date there are approximately 450 simultaneous users of “enterprise Bridge” (eB), which is a proprietary information management system. Each user can search a portfolio of 312,000 records and eventually when all the associated images are loaded, will have the functionality to download and print their own copies of the BCDs, each print will be watermarked as “uncontrolled when printed”.

At this point in time, although 312,000 documents have been located and catalogued, all images are not yet loaded because of import difficulties with the eB system; these problems should be addressed within the next 4 to 6 weeks.

A working party has been convened to formalise the compilation and issue of a Network Rail Level 2 Procedure. This will address the issues of BCD ownership, maintenance of existing documents and the import of new documents which are produced through project delivery.

It is anticipated that all BCDs held in eB will be correlated and validated by the owner that a document deficiency register will be maintained.

A gap analysis will also be performed in order to establish that major gaps do not exist within the BCD library and this will be carried out in Spring/Summer 2008.

Telecoms

The major telecoms focus at present is the roll-out of the Fixed Telephone Network (FTN) and GSM-R project, which is replacing a major part of our telecoms infrastructure. During this transitional phase we need to ensure both that the systems for managing existing assets are maintained and that information on the new assets we are creating is captured and properly managed

FTN/GSM-R project

As part of the FTN/GSM-R project, an asset database designated the Telecoms Asset Store (TeAS) has been developed. This captures all FTN/GSM-R physical assets by type, manufacturer, location, date of installation, components and connectivity type. Relevant operational asset data is loaded into the Operational Support Systems (OSS), based at the Telecoms Engineering Centre in Stoke. Two elements of the OSS are CRAMER (Configuration Based Inventory & Circuit Provisioning) and Remedy ARS (Problem Management and Trouble Ticketing System). Both these systems are used to support the infrastructure fault controls in the real-time management of faults. This will also capture the necessary data for us to carry out a comprehensive Defect Reporting and Corrective Action System (DRACAS) assessment on these new assets.

In Scotland, as part of the Strathclyde trial, the new FTN/GSM-R assets have been brought into service and are being maintained by Network Rail telecoms resources. We are currently using a local database for the control of work management on these assets, similar to the process already in place in the Lancashire & Cumbria and East Midlands maintenance areas.

Use of EQUIP and Ellipse

We are now planning to bring the telecoms maintenance work, currently delivered through the Thales contract, in-house from April 2009. These and other in-house telecoms

maintenance activities will in future be managed through the Ellipse system. This follows on from the successful adoption of this system for E&P assets.

Our procedures for fault management will be an extension of those already in place for FTN assets commissioned to support Synergy schemes.

A database for operational telecoms assets called EQUIP was developed and implemented in 2004. This was required in order to support roll-out of the Fault Management System (FMS) as a short-term solution for Operational Telecoms assets which, at that time, were not captured in Ellipse. The decision to develop the capability of Ellipse for telecoms will now lead to the de-commissioning of EQUIP.

The range of telecoms assets covered by the EQUIP database has now been extended to cover station information and surveillance systems assets on the Network Rail managed stations. This is required in order to support the potential transfer of fault management of these assets to our infrastructure fault control centres.

Work on the National Telecoms Asset Database, is being undertaken to cleanse all other data we hold at territory level such that an asset is described by the same number of fields in every territory. This will aid any migration to both Ellipse and the Decision Support Tool (DST).

Older systems

There are two older asset information systems which contain the circuit allocation data needed for the ongoing support of the existing transmission and cabling networks:

- Transmission Allocation Data System (TADS)
- Cable Allocation Management System (CAMS)

Web-based access has now being provided to enable more efficient use of the information held in these legacy systems. As these assets are progressively replaced by the FTN, this data will become redundant and therefore these existing systems will continue to be used but on a reducing basis.

The current expectation is that up to 50% of the existing copper cable assets will remain in use after completion of the FTN project. The consequence of this decision is that the OSS will need to be enhanced in order to be able to accept the legacy data from CAMS for copper cables, as they become part of our future network.

Decision Support Tool

The first phase of the development of our telecoms DST was specifically concerned with improving and managing the asset data used for the telecoms engineering asset renewal condition assessment and renewal planning processes.

The team have created a controlled standalone spreadsheet for each Territory DST to assist with business decisions for telecoms renewals. This information is being collected against a national standard and the spreadsheets all have a common format. The system has been initially populated with telecoms asset data from the Territory databases and the information from this tool was used to support the CP4 submission.

The DST assists the Territory Telecoms Engineers with identifying and capturing renewals information for all Telecoms assets, from asset type, asset location, asset ID, territory, and ELR, using 5 defined categories (maintainability, operability, reliability, condition and policy).

Because there is no direct operational interface between the DST and Ellipse, an interface with Ellipse will need to be developed in order to synchronise the asset data.

We are about to start a project to select an appropriate software solution such as Oracle application express which will bring these separate spreadsheets together under one national application.

Rail Vehicles

The enhanced Rail Vehicle Asset Register (RVAR) is on target for delivery in March 2008 and will then be rolled out in stages, through the summer, in order to develop operational procedures and training documentation/courses. The functionality has increased significantly and it will now access Base-lined Asset Information (BLI) such as instruction manuals, approvals and technical information, which can be viewed on the desk top. Such information will be version and configured controlled for each individual asset. The system requires populating with the BLI and this is being undertaken in stages which will take, on current estimates, approximately 12 months.

The RVAR is currently being populated with Possession Only Vehicle (POV) information, such that it will become the national register for such vehicles types. The process for issuing unique numbers to POVs has been working effectively for the past 18 months and no further reports are intended, other than if there are any notable developments.

In order to provide the capability to improve the processes of maintenance, modification, repair and replacement for the 2,300 rail vehicle assets which Network Rail owns, the requirements for a Fleet Asset Management System are being specified. This system will enable improved asset stewardship through a variety of activities including maintenance scheduling, inventory management, application of comprehensive workshop management techniques, improved access to asset information and performance monitoring. The implementation will affect to varying degrees a variety of internal functions and external suppliers. The next phase of the project will be to issue an invitation to tender and the evaluation of these is planned for completion in autumn 2008, with delivery of the system in 2009.

The specification for the Operational Property Asset System (OPAS) incorporates the requirements for the management of rail vehicle building assets and OPAS is now being populated with RVE assets.

CROSS-FUNCTIONAL SYSTEMS

CAPEX Management Project

The Planning Development Framework (PDF) project has been re-named as the CAPEX Management Project (CMP). Its purpose is to develop a process and implement a system to capture all of Network Rail's capital investment projects. CMP is relevant to the asset information strategy, as it will provide a single, controlled, source of the asset renewals and enhancement work plans.

CMP will have links to TRPSS, SSADS, CARRS and OPAS all of which are discussed elsewhere in this document. Changes made to delivery plans will be reflected back into these systems via CMP, and vice versa. A simple change control mechanism is included in the CMP processes to ensure these changes are managed.

Among the many benefits CMP will provide is that it will enable work items to be visible and monitored wherever they are in their project lifecycle, thereby providing stakeholders in those projects with a single source of up to date information.

The project is currently in design phase which is due to be completed in July 2008. The system is expected to go live, following build and implementation, in mid 2009.

Fault Management System

With the bringing of maintenance in-house the business required a consistent, national system for managing infrastructure faults. Fault Management System (FMS) was developed as a solution to replace an earlier system called FRAME. FMS records fault history details, operates in conjunction with SINCS and interfaces with Ellipse (asset records, signalling and E&P) and EQUIP (asset records, telecoms).

The system consists of a central hub that is fed details from nine satellite systems (FMS Locals) via a transfer of data. As this is relatively inefficient, we have initiated a complete review to ascertain whether this structure remains the optimum, long term solution in respect of fault management.

A review of FMS has been undertaken by AMCL in their role as Independent Reporter. The review found some issues relating to the configuration of FMS, particularly the lack of an intuitive means of navigating the system for component selection. However, the major issues raised were related to the significant gaps in the population of the root causes of the failures. The principal causes of the population gap were identified as being down to a lack of asset knowledge in Incident Control Centres (ICC) and the lack of detail in the communication of rectified faults for enabling the correct allocation of root causes.

The population issues with FMS had been separately identified in a recent review, which also highlighted a gap in the interface between FMS and the train performance system, TRUST. An action plan has been developed to address these issues. The plan will be compared with the AMCL recommendations and modified appropriately.

A “World-Class” workstream using Six Sigma methodology is looking at improving the data quality of assets, and their information contained in FMS. The program is structured into 5 key workstreams – People, Process, Policy, Performance and System with cross functional workstream owners. This workstream is reviewing the end to end process of fault management and the alignment of the asset failure data in FMS with other legacy systems such as Ellipse and TRUST. The resolution of the FMS population issue and interface with TRUST are the highest priority issues in this data cleansing and collection programme. Specifically it is addressing the following initiatives:

a. A series of improvements to FMS Local, as agreed by end users, have been authorised and are being implemented to improve system navigation and clarity

b. All Priority 1, 2 and 3 faults with a need for a TRUST number are being hard coded to ensure population of this key requirement

c. Fault trees in FMS Local have been reviewed and simplified coding system has been approved which would reduce 5 levels to 2 levels to improve data entry and data quality to generate consistent reports

d. Improvements to FMS Central are being implemented including enhancing the data transfer method between FMS Locals and FMS Central

e. We are funding and providing system training to frontline system users to aid data population and quality

f. We are standardising the Fault Management process as a single process under all ICCs

g. We are improving the data entry and technical training of ICC incident controllers by reviewing training standards and its effectiveness measures

Engineering Document Management

The Engineering Document management project feasibility study has been successfully completed. This work was carried within the wider Corporate Content Management System programme and reviewed the management of documents and records, by engineering discipline, across the functions of Maintenance, Infrastructure Investment and Engineering.

The study considered the whole life cycle of documents supporting asset management, including the process flows within and between the infrastructure functions. The key output has been the definition of a cross functional strategy for the management of engineering asset documentation.

The strategy envisages a wide-ranging change in the way documents and records are regarded and managed in the engineering environment, and recognises them as key parts of the asset information set. Key to achieving this strategy is the development of a nationally agreed and controlled asset document matrix which defines the set of documents required to support individual asset types.

Sponsorship for the development and implementation of this strategy has been incorporated within the Improving Access to Information programme and funding is now being sought to enable the strategy to move forward.

TRAIN-BORNE MEASUREMENT SYSTEMS

Data from the train-borne system is processed within the Engineering Support Centre, Derby; in particular, track geometry data from the recording fleet is processed through the Condition Data Management System (CDMS) and passed to the Condition Data Distribution System (CDDS) data warehouse. Reports are delivered via the portal based Track Geometry Reports (TGR). TGR v2 is in the final stages of implementation and this delivers enhanced reporting and charting for the Maintenance function

Business Problem Statements have been submitted for the extension of the data warehouse to include rail profiles, overhead line, ground penetrating radar and conductor rail data. When complete, this will enable portal based reporting of these information streams.

Track - video inspection

A video inspection system using line scan cameras to capture images of the railhead and fastenings is installed on the New Measurement Train.

The prototype image analysis software called *RailVis* developed by RailVision (Loughborough University) for automated recognition of track components and features is currently being enhanced; a trial is in the early stages of being arranged on an area of the network yet to be selected.

Track - rail profile measurements

Rail profile measurement systems installed on the Southern Measurement Train (KLD Orian) and UTU3 (ImageMap LPMS) are providing data that is post processed in the Engineering Support Centre into reports of rail wear condition. Developed in conjunction with South East Territory track engineers, these reports are currently delivered as spreadsheets. It is planned to integrate these reports into CDMS/CDDS following completion of the planned modifications to the TGR system.

Two additional KLD Orian systems have been successfully fitted to UTU2 and UTU4 during the winter, and are expected to enter production service in April 2008.

Track - structure gauging

The enhanced white-light system has been successfully operated on the Structure Gauging Train (SGT), and the feasibility study for the enhancement of the collection of profiles through the reduction of ambient light pollution has been completed. This has identified the Laser Rail LaserFlex technology as the optimum solution. Detailed design and manufacture work will now progress with a target installation date of August 2008.

E&P - overhead line monitoring

The development coach of the New Measurement Train (NMT) has been fitted with a Fraunhofer laser measurement system for measuring heights and staggers of the overhead line and an instrumented pantograph. This will enable the system to be operated in two modes: an unloaded wire profile with the pantograph lowered and a loaded profile with the pantograph raised. To compensate for the body roll on the development coach the pantograph has had to be mounted on an active mechanism.

System validation testing on the Fraunhofer non-contact system for measuring heights and staggers has now been completed and results are being published. Validation work on the Instrument Pantograph will now commence and the installation of the Fraunhofer wire wear unit on the NMT is scheduled for April 2008.

Software has been developed for use within the Engineering Support Centre to produce initial reports for distribution to engineering and maintenance staff. Further plans to provide a centralised data management system, operating via the corporate portal, will depend on user requirements.

Telecoms – legacy radio signal strength and quality

An important parameter for our operational radio systems is radio signal strength. For the existing legacy radio systems (CSR, NRN and RETB) we currently check that the correct radio signal strength is being provided by measurement from surveying vehicles. We are now starting to present this data on the Corporate Network Model, such that it can be viewed by engineering and maintenance staff via the GI Portal GIS tool.

Telecoms – GSM-R radio quality and performance

A detailed specification for more advanced radio data capturing tools, which also provides GSM-R commissioning and in-service monitoring facilities, including quality of service measurements, has now been published as part of an ongoing competitive tendering process to provide both on-train measurement technology and a database and analysis package.

GSM-R performance measurement, particularly of the air interface, requires a much greater depth and frequency of measurement that the legacy analogue radio systems. It is proposed to supplement the periodic and calibrated measurements of GSM-R air interface metrics from timetabled test trains with much more frequent call performance testing to identify service affecting issues. A technical proposal to include what has been termed as probing functionality on the GB cab mobile is currently under development, meaning that infrastructure-wide testing could be cost effectively and remotely conducted using the GSM-R mobiles in the back cabs of service trains. This approach gives the added bonus of providing another means to locate train radio installations that exhibit sub-optimal performance.