

**Progress Report on the
Development of the Asset
Information Strategy and
Asset Register**

October 2008

Executive Summary

Network Rail's Asset Information Strategy, first published in October 2001, set out plans for compliance with condition 24 of the Network Licence. Its purpose was to identify solutions to improve the delivery of asset information to meet both our own business requirements and those of our customers and stakeholders.

The last three years have seen an intensive programme of work to meet the terms of Licence Condition 24, made more explicit in the Asset Register Guidelines published in 2005. In December 2007 we informed the ORR that we believed all the criteria for compliance with LC24 had been met and in May 2008 the ORR Board endorsed this view.

The challenges faced in meeting the demands of a growing railway with improved outputs at an affordable cost provide further stimulus for the next stage of development in the way the company manages its asset base. We have adopted the approach of whole-life, whole-system asset management, and have developed a framework around which asset management activities can be integrated, supported and monitored.

Governance, leadership and direction of both asset management and asset information is provided by a strengthened Asset Management Strategy Steering Group, renamed the Asset Management Group, which monitors the progress of all activities under the asset management banner and provides the strategic interface with other major corporate initiatives.

Day-to-day management of asset information and data has also been strengthened through the recent Phase 2A and Engineering Focus on the Future Stage 2 reorganisations that have seen a significant increase in the number of roles undertaking asset data management activities. This will see greater efficiency in system updates, improved data management and, through being based in the Maintenance Delivery Units and the direct maintenance organisations, increased access to a local knowledge of assets that will support further improvements in data quality.

Since the April 2008 report, continued delivery of the Asset Information Strategy has included the successful implementation of the Rail Defect Management System, the delivery of key information sets overlaid onto the Corporate Network Model and the introduction of new train-borne monitoring datastreams. Developments continue with other major system initiatives.

We believe that the quality, coverage and accessibility of our asset information is on a par with good practice in UK utility companies and European railway administrations. Our objective going forward is to continue to progress, develop and adopt best practice in the management of asset information.

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Introduction

Document Purpose

Network Rail is responsible for the operation, maintenance, renewal and, in cooperation with train operators and funders, the development of the national rail network. The safe and efficient discharge of these responsibilities requires access to data about network assets that is fit for its intended purpose.

The Asset Information Strategy was first published in October 2001. This set out plans for compliance with condition 24 of the network licence, which defines a number of obligations relating to the asset register, and set out a broader vision for improved asset knowledge management.

Since its initial publication the Asset Information Strategy (AIS) has developed and evolved to meet changing business requirements, technological advances, etc... and was last issued in September 2005. However, whilst the realisation of the Strategy has changed over time the four key principles upon which it was founded remain essentially the same:

- the establishment of **ownership** and control of the required data
- the **availability** of sufficient current and historical data on asset performance and operational characteristics, to allow fact-based decision-making
- the **integration** of asset information across the organisation to establish a single, coherent and consistent view of assets, and their roles within the network
- the adoption and enforcement of a **consistent** approach to asset information processes

The Progress Report was instigated to deliver six-monthly updates on the development of the strategy and provide an overview of progress made with the systems and projects that will realise the strategy. This report provides an update on the development and implementation of the Strategy and reports on progress made with individual systems and projects since the last Progress Report dated 1st April 2008.

In addition, we are continuing to develop our Asset Management Strategy (AMS), first published in support of the October 2007 Strategic Business Plan. The Progress Report provides a brief overview of the latest developments in asset management in order to provide a context in which the continued development and implementation of the Asset Information Strategy can be understood.

Document Audience

This Progress Report is issued to the ORR in accordance with the requirements of Network Licence Condition 24.

Our customers and stakeholders have an increasing requirement for access to infrastructure information and the report will be published on the external Network Rail website.

The report will also be made available to an internal Network Rail audience through corporate intranet and document management systems.

Developments since April 2008

Licence Condition 24

Condition 24 of the network licence stipulates as its primary obligation the establishment and maintenance of a register of relevant assets. The provisions of LC24 were, in September 2005, augmented by a series of Asset Register Guidelines and a compliance framework that identified the main tasks (and their acceptance criteria) that our Asset Information Strategy would have to address to deliver compliance with the licence condition.

The priority over the last three years has been to deliver these tasks and a programme of work to achieve this was completed on time in September 2007. In December 2007 we notified the ORR that we believed compliance with Licence Condition 24 had been met and, following verification by AMCL, the Independent Reporter, the ORR Board endorsed the achievement of compliance in May 2008.

It is intended that AMCL will continue to undertake further audits and assessments to confirm the compliance framework is operated fully and is consistently well maintained throughout Network Rail, that asset information provided to external stakeholders is current, timely and accurate, and that asset data overall is sufficiently accurate and consistent for use.

In addition, we are continually seeking to improve our provision and use of asset information in order to meet the changing needs of the business, and a number of potential improvements have been identified through recommendations arising from internal gap analyses and audits undertaken by AMCL. An increased focus on the entire lifecycle of each asset is resulting in a more integrated approach towards Asset Management and, with asset information taking a central, and integral, supporting role, it is within this context that further development and evolution of the Asset Information Strategy will take place.

Leadership and Governance

Leadership of the asset information programme of work has been provided since 2005 by the Asset Management Strategy Steering Group, AMSSG. It has been particularly effective in providing direction to the work undertaken to comply with the Asset Register Guidelines and in specific areas of the business plan submissions for CP4.

With these work programmes largely complete it has been appropriate to review the role of the AMSSG within the context of how we intend to move asset management forward across the company. This review has been completed, resulting in the following decisions and actions:

- Asset Management has been identified as one of a small number of major initiatives that the company will prioritise through CP4
- The AMSSG has been strengthened, including more senior level representation from Maintenance and Infrastructure Investment, and has been renamed the Asset Management Group, AMG
- A programme of work comprising eleven workstreams has been agreed by AMG, with the objective of establishing Network Rail as the leading asset management company in the UK

Asset information and asset systems comprise two of the eleven workstreams and are major components of the overall programme. Under the Asset Management initiative, the AMG will continue to provide the direction, leadership and governance for asset information initiatives and the Asset Information Strategy previously given by the AMSSG.

The Asset Management Framework

The Asset Management Strategy was first issued as a supporting document to the October 2007 Strategic Business Plan and presented a strategy for the sustainable management of railway infrastructure assets. The Strategy is underpinned by a set of core principles and by the Asset Management Framework.

The Framework provides a methodology for overseeing and monitoring the efficiency and effectiveness of asset management activities. It recognises the key asset management decisions that link the high-level specification for the railway network as a whole to the delivery of specific work activities against individual assets. Against these are a series of enablers that support the delivery of asset management decisions and a series of review processes that monitor the effectiveness of the asset management system through audit, measurement, review and feedback.

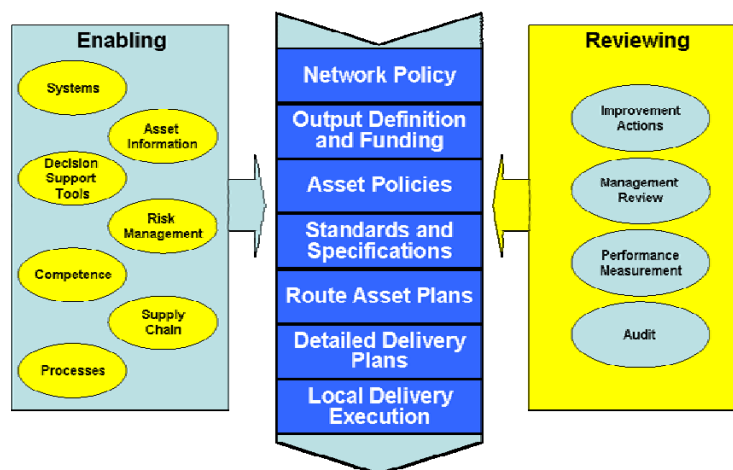


Figure 1: The Asset Management Framework

The Framework recognises asset information and asset systems as key enablers of the asset management process and the Asset Information Strategy is therefore concerned with supporting the Asset Management Strategy by ensuring timely, accurate and accessible asset information at all stages of decision making.

No major realignment of the Information Strategy is required; core principles underpin both strategies - the consolidation of data for a single source of truth, fit-for-purpose and flexible delivery solutions, timely and accurate quality information. The Framework does, however, provide a renewed focus on key information requirements and emphasises the alignment and cross-functional co-ordination that will be required by all enabling elements in order to fully realise the management strategy.

Asset Information and Systems Workstreams

Our asset management decision-making processes have benefited over the past two years from improvements in the availability and quality of asset information. The emphasis has been on ensuring that each discipline is supported with the core information it requires on location and type of asset, condition and performance, and the unit costs associated with renewal and replacement.

Whilst the current provision of asset information provides adequate support to existing asset management processes, further development of both information and systems is required to enable us to identify and implement optimal decisions on maintaining, renewing and enhancing the infrastructure.

The objective of the asset information workstream is therefore:

- to specify longer term information requirements necessary to support an effective asset management regime across all asset disciplines

and for the systems workstream:

- to complete a 'to be' applications, technology and data architecture in support of the new 'to be' business architecture being defined by the other Asset Management workstreams. To identify opportunities for change to the existing IM systems estate and to produce an IM Asset Systems strategy to realise them

Though separate, the asset information and asset systems workstreams will have to work closely together to deliver these objectives. The foundation for both workstreams must be an understanding of the core information required by the asset management processes that support the key decisions identified in the Framework. From this understanding current provision of data specifications, collection rules, data storage and information delivery systems, etc... can be assessed and work undertaken to remedy any shortfalls and improve the quality of current provision:

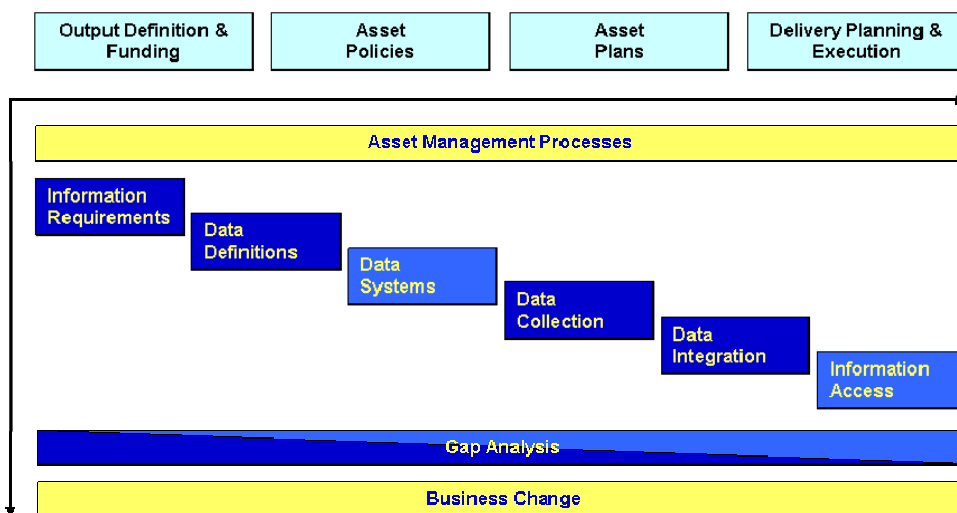


Figure 2: Asset Information and Systems Workstreams

Systems Architecture

The previous issue of the progress report presented a high-level overview of the strategic architecture that would be required to realise the Asset Information Strategy, and described key components including the Central Asset Inventory and the introduction of Enterprise Architecture as the governing framework for the definition, analysis and management of information application requirements.

The latter has led to Network Rail investing in The Open Group's Architecture Framework, a comprehensive approach to the design, planning, implementation, and governance of enterprise information architecture. The framework uses four major components to define a business model and provide a roadmap for development:

- business architecture - business strategy, process governance, organisation
- data architecture - logical / physical data structure and data management resources
- applications architecture - blueprints for applications, and
- technical architecture - hardware, software and network infrastructure

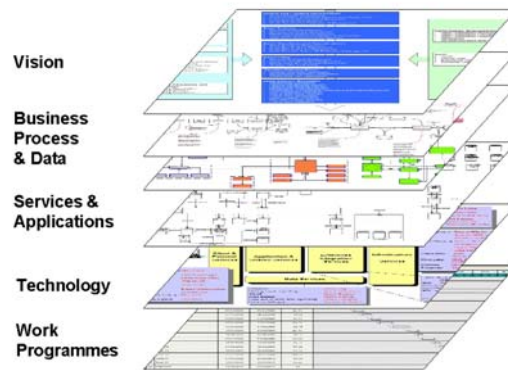


Figure 3: Diagrammatic representation of Enterprise Architecture

The introduction of new systems is a major challenge that can be met in many ways. A 'big bang' approach offers the quickest solution but can involve too much change in too short a time, incurring an unacceptable level of risk. The 'silo' approach of developing specific systems to address specific problems may incur the lowest risk and cost but would not provide the level of integration necessary to deliver the Asset Information Strategy.

The preferred route is therefore to implement a staged approach, moving from the 'as is' to the 'to be' using Enterprise Architecture as the mechanism to provide strategically aligned programmes to govern systems development. The stages comprise four themes:

- **Stabilisation**: ensuring existing systems are capable of taking on new requirements
- **Enhancement**: extending existing systems where required
- **Rationalisation**: of systems that are no longer required
- **Build or buy new**: where requirements are not met by existing system functionality

We are reviewing the systems portfolio with a view to establishing a plan to rationalise, refresh, renew or retire systems based on agreed functional and technical quality criteria.

Organisational Structure

The previous functional structure was introduced in 2004 since when a number of important changes have taken place within the company, notably the progressive bringing in-house of the maintenance functions.

The Maintenance Phase 2A organisational changes, which went live on the 8th September 2008, have been put in place to standardise and simplify the structure of the Maintenance function and to improve performance and efficiency by devolving greater responsibility, decision making and self-sufficiency to the delivery units whilst ensuring enhanced support from national disciplines within Engineering and Maintenance. As a result of Phase 2A, the former Territory and Area structure has been replaced with one based on nine routes and forty maintenance delivery units.

In parallel, the Engineering Focus on the Future Stage 2 organisational change saw the function move away from a territory to a national skills base and adopt a more project-based approach to work, resource and competence management. This followed an earlier reorganisation, in March, that saw the creation of the Asset Management team under the Chief Engineer, with responsibilities that include the continued development of the Asset Information Strategy, corporate reporting on asset information and monitoring, and the measurement and reporting of data quality relating to all asset disciplines.

Asset Data Management

Under the previous organisational structure the Asset Data Maintenance and Data Quality Co-ordinator teams, attached to the area and territory level organisations respectively, were accountable for the management, maintenance and quality of asset data within GEOGIS and Ellipse.

Phase 2A has seen the ADM and DQC teams replaced by System Support teams in each of the Maintenance Delivery Units, reporting to the Infrastructure Maintenance Services Manager. Each team comprises a manager and at least one assistant, representing a doubling in the number of posts responsible for the management of asset-related data from the previous organisational structure.

Whilst overall accountability for data management and quality for both Ellipse and GEOGIS lies with the Systems Support Manager, ownership of the data resides with the discipline engineers within the direct maintenance organisation and technical staff reporting to the engineers have responsibility for the management of the asset records in both systems. Again this sees an increase in posts responsible for data management and allows the local knowledge of assets to be more readily utilised to ensure quality of information.

By the end of September 2008, population of data management posts was over 85%, with recruitment being undertaken to fill the remaining positions. Many of those taking up posts are from the previous data management environment, and training courses are provided for those with less experience. Benefits associated with the increase in posts - improved data management, greater efficiency and increased data quality - will start to be realised through the next two to three months and progressively thereafter as the new structure beds in and those staff who are new to asset data systems gain experience.

Asset Data Quality

The Engineering Data Quality and Maintenance Systems and Data National Specialist Teams are continuing to work together to co-ordinate, prioritise and report on asset data quality issues throughout the company. Common objectives will be set to ensure that focus remains at national level on improving the overall quality of asset data.

Progress with Current Projects

An overview of systems and projects that represent key deliverables in the implementation of the Asset Information Strategy.

Core Asset Information Systems

Corporate Network Model (CNM)

The CNM development programme was instigated in October 2007 to manage the requirement for geospatial information applications. It consists of a programme of cross-functional projects that will deliver core applications, high-priority business datasets in a web-based geospatial format, and a number of new short and medium term initiatives that will capitalise on the core projects:

Network model merge

A pivotal project that will produce a unified track level geospatial network model integrating the currently different Operations and Engineering geographies. It will provide a single, maintainable view of the national network across business functions.

The merge of GEOGIS and CNM data was completed at the end of September 2008, providing a definitive, integrated geospatial/engineering representation of the network. The Integrated Train Planning System model will now be merged with CNM to create a unified geospatial/engineering/operational model for use by the business. This, and a process for the maintenance of the model, is due to be completed by the end of January 2009.

Train mapping

A project to develop a system that will monitor individual train movements at track level. Two key components of this system are:

- Train Operations Data Store: a data warehouse for train-running information
- Complete Traffic Data System (CTDS): an application that will allow the aggregation and monitoring of tonnages, capacity and wear information and allow track utilisation trends to be monitored and viewed against parallel business information - maintenance inspections, infrastructure capabilities and cost modelling.

The train mapping project has now completed its initial design stage and will be developed and implemented by May 2009 - this will include the decommissioning of the North East Traffic system, NETRAFF.

Schematic network diagrams

A project that will deliver the automated creation of schematic network diagrams, based on the Five Mile Line Diagrams, with data taken directly from the underlying network model and master asset repositories.

The project design phase, now due for completion in October 2008, has required a three month extension due the high level of complexity involved. The implementation phase has been reduced by a month, however, and the project is forecast to be completed at the end of April 2009.

Data layers

The development and implementation of a series of layers that can be overlaid onto the network model to enable primary information sets to be viewed and manipulated in a geographic context.

The project has already seen the delivery of information sets pertaining to, amongst others, infrastructure capability, track geometry and rail grinding. Information sets currently being developed include signal interlocking and telecoms network cabling data, both due for completion by the end of 2008.

Master Map

Master Map, an aerial imaging product from Ordnance Survey, has now been implemented within CNM. Two new data layers - topography and aerial imagery - are undergoing environmental testing before being released to the user community in September 2008.

Access by external stakeholders

Allowing access for external stakeholders to key capability information, this project has been approved by the investment authority and is now mobilising for delivery in April 2009.

Signal register

This will provide a definitive signal location register drawing together records from existing sources and mapping them to the unified track model.

This is a key enabler for a number of business-wide initiatives, particularly CTDS, and will be implemented in parallel with CTDS by May 2009.

User interface

A development project to identify how best to refresh the technology that supports Network Rail's geospatial.

The majority of this work is planned for 2009. It will fulfil the need to provide a flexible data architecture to support growing demand, coupled with the development of a new user interface that is easy to use and easy to upgrade in the future. Authority to begin feasibility work will be sought in November 2008..

Track Asset Systems Replacement (TASR)

The Track Asset Systems Replacement project was started in 2006 to explore the future of GEOGIS, the core register for track and structures information.

CARRS, OPAS and Ellipse have rendered the structures capability of GEOGIS redundant and a detailed system design to replace GEOGIS' remaining track-based functionality was approved in August 2008. The decision for in-house development has been revised and development of the system will now go out to tender - this process is currently underway.

Ellipse

Ellipse is the corporate Infrastructure Maintenance works management tool and is:

- the means by 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

Considerable work has been undertaken to ensure that Ellipse is fully embedded and understood by the business. Quality of data within Ellipse has also been a high priority - internal measurement has shown a continual improvement in this area.

The following Ellipse enhancements are being progressed:

Re-configuration of the E&P asset structure

The original population of E&P assets was inconsistently applied across the Network and a major exercise was undertaken to reconfigure over 200,000 assets in line with agreed design principles. This was completed in September 2007. An action plan is being developed to address a few remaining asset categories and apply standard Maintenance Scheduled Tasks.

OLE assets conditioning monitoring module

This module for the capture of OLE asset condition data was positively piloted in five delivery units through 2008. Feedback from the pilots is now being reviewed with the intention of rolling the module out nationally following the review.

Standardised telecoms inspections capability

The requirement for a standardised telecoms inspection capability in Ellipse for those areas where maintenance of telecoms assets has been in-sourced has now been implemented to schedule. Work is currently being undertaken with the Telecoms Transaction team to apply the design corporately in anticipation of further in-sourcing in April 2009.

Handheld solution for Track Section Managers, Ultrasonic and Fencing Inspectors

The decision to deploy handheld functionality to the Track discipline has been put on hold pending a strategic review of mobile technology requirements for all appropriate Infrastructure Maintenance staff, in respect of both device and software selection. Formal investment approval for this review has been given.

Provision of reference data to mobile devices

A proof of concept is being developed to show how reference documentation can be introduced onto handheld devices in order to exploit mobile solutions for frontline staff. Finalisation of the 'look and feel' of Red Book documentation on current handheld devices will now take place in October 2008 due to Phase 2A changes taking precedence.

Business intelligence reporting solution

The provision of a business intelligence reporting solution to provide efficiencies in productivity and compliance reporting will now be implemented by late 2009 due to resources being utilised by the Phase 2A organisational changes and a review to provide clarity of requirements.

Vegetation works management

An initiative to create and implement a standardised means of carrying out vegetation management within Ellipse. The full system design stage has not yet commenced, however a tendering stage to ensure data collection is carried out in a robust and consistent fashion is underway. It is envisaged that the initiative will be completed by March 2009.

Off-track drainage works management

This initiative to create and implement a standardised means of carrying out off-track drainage works management within Ellipse has not yet been started. It is envisaged that it will be completed by July 2009.

Discrete Systems By Discipline

Track

Rail Defect Management System (RDMS)

The rollout of the Rail Defect Management System commenced on schedule in May 2008. Two territories have had their data migrated into the new system and are actively using it. Usage of local legacy systems is being phased out, with legacy data being preserved in an archive form. Rollout of RDMS to the rest of the network will be undertaken following completion of the re-organisation of the Maintenance and Engineering functions.

The RDMS database holds data on:

- suspected rail defects (from ultrasonic indications detected by the ultrasonic test trains)
- confirmed rail defects (including defects in cast crossings)
- broken rails
- rolling contact fatigue (RCF)
- derailment hazards at switches (from NR/SP/TRK/053 inspections)

Data on each of these categories is held as distinct datasets, but RDMS links the information. RDMS also interfaces with Ellipse, and enables work orders for inspection and remedial work to be raised and viewed from within RDMS. This provides the users with a single web application to view and manage suspect defects, confirmed defects, RCF and derailment hazards at switches. The project is also creating a separate system to hold all results of NR/SP/TRK/053 inspections.

RDMS has been developed in Java: this will facilitate the integration with other systems with common software components being used by several applications. Once fully deployed, RDMS will give us a single company-wide rail defect recording process, replacing the legacy IMC rail defect systems and superseding the obsolete Raildata system used to consolidate rail defect data to a network level.

The system has been well received by the users. Pre-deployment training and briefing has been carried out, continuing the extensive user involvement that has been achieved from the start of the project..

In order to ensure a smooth change of process it was necessary to pause the roll-out of RDMS pending completion of the recent reorganisation within both Maintenance and Engineering; RDMS has been re-engineered to align with the new organisation structures and formal system tests were carried out to validate the changes. Rollout has now restarted, with the final location due to commence implementation in mid-November 2008. The last of the legacy systems are expected to be decommissioned in December 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 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 a single 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
- the potential to maximise service life of track
- efficient and economic track renewal
- optimisation of passing clearances and clearances at structures to accommodate longer, wider passenger vehicles, and taller, more angular freight loads
- making clearance gauging data more widely available, and 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 the ATG database, will inform the development of the integrated system.

Track renewals

The Track Renewals System (TRS - previously known as TRPSS) is a corporate system to support the cross-functional work flow and specification of track renewal proposals. It also facilitates the audit of output against specification.

Maintenance teams at delivery unit level enter renewals proposals as problem statements into the database. These proposals are then reviewed by engineers: 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.

For plain line renewals TRS has replaced the local spreadsheets and databases that were used historically for track renewal workbank management. (At present, S&C renewals continue to be managed via these manual systems).

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 provide other facilities, such as the ability to store and link files associated with each renewal, and hold the Design Risk Register to meet CDM regulations. The development will be delivered as a series of incremental releases.

The development of TRS was impacted by the upgrade of our corporate database platforms from Oracle 9i to 10g, introducing delay and changes to ongoing development activity. Subsequent development has been slow, with problems in recruiting and retaining

developers with skills in the legacy technologies used to build the application, and the need to rework the application to suit the new organisation structure. Information Management policy is now to use Java in these corporate, web-based applications to provide a more robust framework for subsequent development and to facilitate systems integration. A re-write of TRS using Java is under consideration.

A series of releases of TRS are planned between September 2008 and February 2009 to address the new organisation structure, file storage and linking, the Design Risk Register and changes that will support future development and maintenance of the system.

Rail welding

The National Welding Database was created to support a single company-wide weld data recording process. It was rolled out to all Maintenance areas during 2007. Following the successful development of the Rail Defect Management System, a redevelopment of the National Welding Database is under consideration. The intent would be to build on the experience of using the existing welding database by providing better functionality and applying the IT technologies used in RDMS to give improved response time and integration with other systems.

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, three Maintenance areas did not adopt this corporate solution. They continue to use legacy systems, with data input being undertaken by the boundary and fencing management teams, rather than the Ellipse teams. As a consequence of the recent reorganisation of the Maintenance function the responsibility for data input to all systems has changed. The transition to using Ellipse for boundary records in the remaining three areas is being progressed as part of the new arrangements.

Civils

Civil Asset Register and electronic Reporting System (CARRS)

CARRS was developed as a structures asset management system to operate at a national level.

The use of CARRS will ensure that structures asset information is collected and managed consistently. It is a work flow system that 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 allowing for the electronic sign off of reports that will generate work items that can be exported to the delivery organisation.

Full implementation of CARRS will allow Network Rail to replace the multiple local systems currently in operation throughout the territories (i.e. GEOGIS, local databases and spreadsheets) and have a single asset management system containing information of the whole structures asset portfolio.

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 completion of Phase 2.

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

Phase 2 feasibility and design has been completed on the Risk Based Examinations management tool and identified enhancement opportunities. Delivery of this functionality is currently forecast to be April 2009.

Other enhancements - incorporation of all linear assets (earthworks & drainage), Structures Condition Monitoring Index (SCMI) tool, assessments functionality and interfaces with other systems - are currently being reviewed as part of Network Rail's wider asset management strategy and a programme plan for future workstreams, with timescales for implementation, will be available for reporting in February 2009.

Operational Property Asset System (OPAS)

OPAS is the master database for all Operational Property asset data, providing a centralised repository for all reporting, strategic business planning and scenario analysis. The system is web-based and will be accessible by authorised third party users.

The initial phase of data collection to populate OPAS was completed in September 2007 and concentrated on assets representing 80% of Operational Property's maintenance and renewal expenditure. Further data capture will continue as a 'business as usual' activity in accordance with Network Rail's company standards. Data is captured via handhelds and processed in a proprietary asset management software package.

The current system and data serve to underpin our plans for Operational Property assets. Whilst the system can provide for the requirements of an asset register and a reactive fault management system it is not currently fully functional. A programme of system development work will deliver more functionality to meet the business requirements over the coming months, with completion and final roll out to the business occurring in 2009.

Electrification & Plant

Business Critical Document Project (BCD)

The Business Critical Document project was launched in November 2007 with a remit to catalogue and scan 17 types of business critical documents. There are now approximately 500 users of eB, a proprietary information management system that provides access to a portfolio of 311,000 records and functionality for users to download and print their own document copies, each automatically watermarked as "uncontrolled when printed - subject to change".

A Level 2 procedure, NR/L2/ERP/21120, detailing the management and control of business critical documents has been formulated and published with an anticipated compliance date of December 2008. The National Records Group has set up a dedicated team to manage business critical documents in line with NR/L2/ELP/21120 and all requests for source records are now placed with this team.

All business critical documents held in eB will be correlated and validated by the document owner, following which a document deficiency register will be maintained. This is a register of assets and infrastructure for which there are no BCDs currently, though there may be a requirement for them in the future. A pilot gap analysis looking at potential gaps within the BCD library was undertaken through Spring/Summer 2008 and a report compiled, but future policy and actions are yet to be decided.

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.

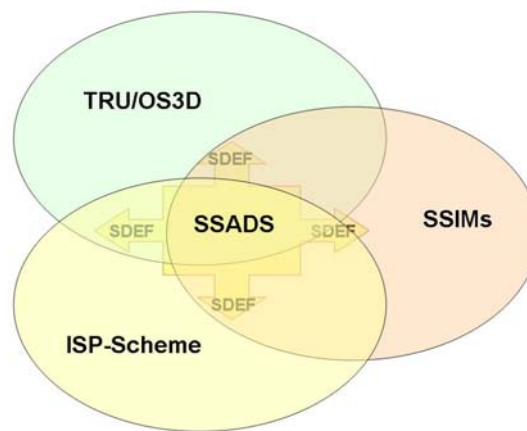


Figure 4: STAMP Principal Workstreams

As the STAMP development matures five principal workstreams have emerged as the core to the management of the Signalling asset data within Network Rail, i.e.:

- The use of the Track Recording Unit (TRU) and the development of high definition video kiosks; surveying the 'as-is' railway and providing asset data to engineers for use within their design tools.
- The deployment of ISP-Scheme; the design tool that takes asset survey data and turns it into the base Scheme Plan.
- The visualisation of the designs within Signalling Schemes Image Models (SSIMs); providing the engineer and stakeholders with a 3D view of the 'to-be' railway before construction even starts.
- The store of the 'to-be' signalling asset data within the Signalling Schemes Asset Data Store (SSADS); a database of the evolving resignalling schemes from asset condition assessments to eventual handback as the new 'as-is' railway.
- The Signalling Data Exchange Format (SDEF) that allows the efficient movement of signalling asset data between these principal workstreams and also to analysis tools such as those for headway and signal overrun assessments.

Automatic Mapping Of The Railway

This will see signalling data in the form 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 simulator models and driver route learning.

With the signalling upgrade of the TRU complete a process for projects to request the use of the TRU for signalling asset surveys has been trialled on modular signalling and ERTMS projects. With the completion of these trials the use of the TRU for signalling surveys moves away from the development programme into a 'business as usual' environment that will see resignalling projects working directly with Asset Management.

These trials have also seen the development of a stand-alone high definition video version of Omnicom Engineering Limited's OS3D software. After a period of successful use by signalling designers within Network Rail it is anticipated that an integrated, networked solution will be required to deliver high definition images and OS3D functionality in the future.

Intelligent Scheme Plans (ISP)

Both ISP-Scheme and the second release of ISP-Sketch are now in use in Network Rail and are available for use by signalling designers external to Network Rail. These design tools, in particular ISP-Scheme which makes use of the signalling asset survey data from the TRU, will see the effective and robust incorporation of 'as-is' signalling asset data into resignalling designs.

Phase 2 of ISP-Scheme is currently the subject of an invitation to tender for its development that will deliver a modern design tool for the production of Signalling Scheme Plans and subsequent child documents such as Aspect Sequence Charts, Location Area Plans, Stageworks Plans, etc.

ISP-Sketch is entering the development phase for its third release in response to change requests from users after use on projects such as CrossRail and Modular Signalling. ISP-Sketch is using a process of Rapid Application Development (RAD) that sees requested functionality delivered to users at a managed but faster rate. ISP-Sketch has also been chosen as the 'engine' to drive the emerging Headway Analysis Tool (HAT) and the Signal Overrun Risk Assessment Tool (SORAT).

Signalling Schemes Image Models (SSIM)

Following on from the successful use of virtual reality and high definition video in models and simulations for the sighting of signals, programme modelling etc... Network Rail is currently working with suppliers to create an environment where the use of visual 'engineering models' of the 'to-be' railway becomes the norm for resignalling projects, i.e. modelling and/or simulating the railway prior to the start of construction, all under the heading of Signalling Schemes Images Models. The use of these models and simulations can include:

- Risk Based Signal Sighting
- Constructability Assessments
- 4D (time) Simualtions
- Driver Route Learning
- Lessons Learnt Reviews

- Driver Training & Assessment (migration to)

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.

Following on from a series of workshops where future users of SSADS were exposed to 'touch and feel' mock-ups to allow the all important user interface to be matched to their needs, the development programme is now entering the critical stage of data cleansing and migration.

Benefits from Phase 1 of SSADS include:

- Greater control of assessment planning and visibility of results
- More detailed (granular) of signalling asset condition data
- Improved planning of signalling renewals workbanks, i.e. at more detailed level
- Enhanced data quality (e.g. assets mapped to interlockings via CMN)
- Improved data warehouse reporting tools
- Reduce the number of signalling asset databases

Phase 2 of SSADS is planned to commence with CP4, but is dependent on the revised timescales of Central Asset Inventory (CAI) and the Capex Management Planning (CMP) development programmes.

Signalling Data Exchange Format (SDEF)

In November 2006 an XML Schema called the Signalling Data Exchange Format was launched to the industry in order to facilitate signalling data exchange tasks.

The development of a SDEF validation tool has recently been added to the STAMP scope, initially for use in validating the use of SDEF by emerging tools. Originating from a workshop held with industry representatives it is planned to move this tool into production as a SDEF Validator for industry wide use. Version 5 of SDEF itself is due for release via its secure web site SDEF User Portal Access (SUPA).

Telecoms

The focus continues to be the roll-out of the Fixed Telephone Network (FTN)/GSM-R project that is replacing a major part of the telecoms infrastructure and the need, during this transitional phase, to ensure continued support for systems managing existing assets and for data and information on new assets to be captured and properly managed.

FTN/GSM-R project

As part of the FTN/GSM-R project an asset database, the Telecoms Asset Store (TeAS), has been developed. This records information on all physical FTN/GSM-R assets including type, manufacturer, location, date of installation, components and connectivity type.

Relevant operational asset data is loaded into the Operational Support Systems, based at the Telecoms Engineering Centre in Stoke, and these systems are used to support Defect Reporting and Corrective Action System assessments on the performance of the new telecoms assets. Data captured in the OSS is also shared with the Integrated Control Centres to assist with the real-time management of faults.

New FTN/GSM-R assets that form part of the fixed infrastructure which support the Strathclyde trial are now being maintained by Network Rail resources, with maintenance activities managed through the Ellipse works management system.

Use of EQUIP and Ellipse

It is planned to bring telecoms maintenance work, currently delivered through the Thales contract, in-house from April 2009. Maintenance activities will be managed through Ellipse, with faults continuing to be managed through the Fault Management System in the Integrated Control Centres. Development of Ellipse for telecoms assets will lead to the decommissioning of EQUIP, our operational telecoms asset database. This is also planned for April 2009.

Originally undertaken to support the potential transfer of fault management activities to the Infrastructure Fault Controls, EQUIP had been expanded to hold data on Network Rail Managed Stations Information and Surveillance Systems. Emerging strategy suggests that these systems may in future (post April 2009) be managed through the Property Works Organisation within Infrastructure Maintenance.

EQUIP has also been extended to allow the ICCs to manage faults associated with the Fixed Telecoms Network and GSM-R/IVRS systems.

Data-cleansing activities have been undertaken on all other territory-based asset databases in order to standardise asset records. This will aid migration of data to both Ellipse and the Decision Support Tool (DST).

Legacy systems

Web-based access has enabled the more efficient use of two legacy asset information systems that contain the circuit allocation data required to support existing transmission and cabling networks: the Transmission Allocation Data System (TADS) and the Cable Allocation Management System (CAMS). As legacy assets are progressively replaced by the FTN this data will become increasingly redundant and system usage will reduce accordingly.

It is, however, expected that up to 50% of existing copper-cable assets will remain in use after completion of the FTN project and, as these assets become part of the future network, data will have to be migrated from CAMS to CRAMER, a part of the OSS. CRAMER will need to be enhanced in order to accept this data and provide day-to-day change control of cable pair allocations.

Decision Support Tool (DST)

Initial development of the telecoms DST was specifically concerned with improving and managing asset data used for telecoms engineering asset renewal condition assessment and renewal planning processes. A series of controlled, standalone spreadsheets were created for each territory DST to assist with business decisions for telecoms renewals. Data was collected to a national standard from territory databases and used to support the CP4 submission.

The DST will now assist the renewals & enhancements engineers with identifying and capturing renewals information for all telecoms assets, including asset type, asset location, asset ID, territory, and ELR, using five defined categories (maintainability, operability, reliability, condition and policy).

Following the Engineering re-organisation, which combined the Telecoms and Signalling renewals & enhancements teams in one organisation, a review of the further development of the DST will be carried out. This will include the appropriateness of bringing the separate spreadsheets together under one national application and any necessary linkage with Ellipse for the extraction of telecoms system data.

Rail Vehicle Engineering

Rail Vehicle Asset Register (RVAR)

Implementation of the enhanced Rail Vehicle Asset Register was delayed, mainly due to problems with the testing of the system. However the system was accepted by Network Rail on the 10th September 2008 and will be rolled out in stages, through the autumn, in order to develop operational procedures and training documentation/courses. Functionality has increased significantly and it will now access base-lined asset information (BAI), such as instruction manuals, approvals and technical information, that can be viewed on the desk top. Such information will be version and configuration-controlled for each individual asset. The system requires populating with the BAI and this is being undertaken in stages which will take, on current estimates, approximately 12 months.

Demonstrations have been given to Head of Security (Network Rail)/Kent Fire Brigade and to the High Output team and positive feedback was received on both occasions. It is planned that local databases will now be migrated into the enhanced system in order to centralise information and gain benefits from the increased system functionality.

RVAR is still being populated with Possession Only Vehicle (POV) information, such that it will become the national register for such vehicles types. Network Rail is evaluating options to reduce the time duration of engineering possessions and the Engineering Works Control System project will use this national register to establish what POV assets are permitted onto the network.

An Invitation to Tender for the Fleet Asset Management System has been issued and the responses have been assessed: it is planned that within the next month the preferred supplier will be notified.

The specification for the Operational Property Asset System (OPAS) incorporates the requirements for the management of rail vehicle engineering fixed plant assets at light maintenance depots.

Cross-functional Systems

CAPEX Management Project (CMP)

The CAPEX Management Project will develop a process and implement a system to capture all Network Rail's capital investment projects. It will provide stakeholders with a single, controlled source of asset renewal and enhancement work plan information, allowing visibility of all work items throughout the project lifecycle.

To support the management of CAPEX projects as we move into Control Period 4 an interim phase has been initiated to put in place a tactical solution. This will support key business process changes and updates to project-related data, providing easier access to information for customers and stakeholders and an up to date picture of the consolidated CAPEX plans on a quarterly basis. Most importantly, the tactical solution will inform the full strategic design, enabling improvements to be identified and a robust solution to be delivered.

Work will continue on the full strategic CMP solution, (i.e. business processes and technical design and implementation); aligned to the asset management framework, this will be delivered as part of the asset management workstreams.

Fault Management System (FMS)

With the bringing in-house of maintenance a consistent national system for managing infrastructure faults was required. The Fault Management System was developed to record fault history details, operate in conjunction with SINCS and interface with Ellipse (asset records, signalling and E&P) and EQUIP (asset records, telecoms).

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

Separate reviews highlighted a number of additional issues surrounding system configuration (particularly the lack of an intuitive means of navigating the system for component selection), significant gaps in the population of the root causes of failures and a gap in the interface between FMS and the train performance system, TRUST.

An initiative using Six Sigma methodology is looking at improving the quality of asset information in FMS. Structured into five key areas - people, process, policy, performance and system, each with cross-functional owners - this workstream is reviewing the end to end process of fault management and the alignment of asset failure data in FMS with other legacy systems such as Ellipse and TRUST.

Resolution of the FMS population issue and the interface with TRUST are the highest priority issues in this data cleansing and collection programme. Specifically they are being addressed through the following initiatives:

Improvements to FMS Local

A series of user-approved enhancements to FMS Locals have been authorised and are being implemented to improve system navigation and clarity. This work is ongoing due to the diversion of resources to Phase 2A.

TRUST numbers for Priority 1, 2 and 3 faults

The work to ensure the mandatory population of TRUST numbers for applicable priority 1, 2 and 3 faults has been completed.

Fault trees in FMS Local

Fault trees in FMS Local have been reviewed and a simplified coding system has been approved that will reduce the number of levels from five to two. This will improve data entry and data quality to generate consistent reports. Work is ongoing.

Improvements to FMS Central

Improvements to FMS Central, including the enhancement of data transfer between FMS Locals and FMS Central, are being implemented. Although some work is outstanding on this initiative due to Phase 2A, a number of enhancements have been implemented.

System training to frontline users

The provision of system training to frontline users to aid data population and quality is complete.

Standardisation of the Fault Management process

The standardisation to a single fault management process under all ICCs is ongoing. This will continue in line with the transfer of the process away from the current IFCs to the ICCs, as will work to improve the data entry and technical training of ICC incident controllers by reviewing training standards and its effectiveness measures.

Engineering Document Management (EDM)

The Engineering Document Management feasibility study considered the whole life cycle of documents supporting asset management, including the process flows within and between the infrastructure functions. The study proposed a cross-functional strategy for the management of engineering asset documentation.

The EDM workstream has been incorporated within the Improving Access to Information (IAI) programme. The first project affecting the management of asset records will be the CCMS2 Civils Pilot. Thereafter it is intended to review the integration of EDM proposals within other IAI Programme workstreams, and their relationship to other asset management related work activities being carried out by the Engineering functions in 2008/9.

Train-Borne Measurement Systems

Track - geometry

Track geometry data captured by Network Rail's fleet of infrastructure monitoring vehicles is analysed and processed through the Condition Data Management System and passed to the Condition Data Distribution System data warehouse. Reports are delivered to users through Track Geometry Reports (TGR), a portal-based data delivery system.

TGR version 2 has delivered enhanced reporting and charting functionality.

TGR version 3 will update TGR to accommodate future changes to the TRK001 track standard.

TGERI (Track Geometry Enhanced Reporting and Integration) will enhance TGR's period and annual reporting functionality to allow the decommissioning of the legacy Track Quality Mainframe system and provide links to the Ellipse works management system.

Track - video inspection

The video inspection system on the New Measurement Train (NMT) comprises line scan cameras and a bespoke collection system that captures images of the railheads and fastening in 3m sections. Upgrades to the current system will begin in October 2008, with a move to latest model linescan cameras and a new capture system that allows a streamlining of the collection process. This is due for completion in March 2009.

Image analysis software allowing the automated recognition of track components and features has been enhanced to enable run-on-run comparisons of track components and the creation of exception reports. These have been designed to support Level 1 basic visual track inspections and a trial of the reports is due to commence shortly on West Coast South.

Track - rail profile measurements

KLD Orian rail profile measurement systems have been installed on ultrasonic test units (UTU) 2 and 4 and the Southern Measurement Train.

Data from the three systems is post-processed into spreadsheet rail wear condition reports available via shared network areas: a solution to provide bespoke reports via the Network Rail portal is currently in design phase.

An initial feasibility study looking into the use of the KLD system for the measurement of S&C profiles has been positive and will be investigated further over the coming months.

Track - structure gauging

The Structure Gauging Train continues to run with the enhanced white light system. The train has been modified over the summer to accommodate the fitting of a LaserFlex system in early November that will significantly enhance the collection of structure profiles through the reduction of ambient light pollution.

In addition, a Trackscan 6' measurement system has also been installed on the SGT and is currently undergoing testing. This will complement the current Trackscan system on the NMT.

E&P - overhead line monitoring

The Fraunhofer non-contact laser system for measuring unloaded heights and staggers of overhead line is now in production on the NMT, with spreadsheet-based reports being delivered to end users via shared network areas. A business problem statement is being developed for a Network Rail portal-based reporting solution.

An instrumented pantograph, capable of measuring a loaded wire profile, and a Fraunhofer wire wear measurement system have been installed on the NMT and are currently undergoing validation and testing. Again it is anticipated that reports from both systems will be delivered through the Network Rail portal.

Ground Penetrating Radar (GPR)

Ground penetrating radar provides engineers with an insight into the condition of the trackbed. This information can be used to verify ground conditions prior to intrusive investigation, to develop suitable specifications for treatments and to audit work after it has been completed.

Following a successful pilot of train-borne GPR measurement on the UTU3 an investment case has been approved for the deployment of two additional systems on UTU2 and the TRU. Installation dates are the end of November and end of December 2008 respectively.

Reports are currently being published to shared network areas. A detailed requirements specification is being finalised for a portal-based reporting solution.

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 a more advanced radio data capturing tool, 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 on-train measurement technology, a data warehouse and an analysis package.

GSM-R performance measurement, particularly of the air interface, requires a much greater depth and frequency of measurement than 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. Options for the use of the GSM-R mobiles in the back cabs of service trains to create call traffic are being re-examined to determine best overall value for maintenance and performance reporting.