

Successful Implementation of ISO 55001 Standard for Road Network Management

Nabin Pradhan (Dr)

DM Roads, A Downer Group Business

**Email: nabin.pradhan@dmroads.com.au*

ABSTRACT: *With the introduction of Asset Management Standard ISO 5500x, more and more road controlling authorities are now working towards adopting this standard for better utilisation of their assets and increased value for money.*

As a road network management service provider, the DM Roads business of Downer's Transport and Infrastructure Division, has been working on aligning its asset management and operations management systems to comply with this standard requirements and guidelines. This adaptation has helped in developing a cohesive framework and means of ensuring that asset management is driven top-down, is properly resourced and coordinated in a way which helps in the significant improvement of operation efficiency with focusing in data-driven decision making.

The adoption process has been challenging as Downer is managing the road network for various road authorities in different states in Australia with considerably different asset management policies, strategies and contracting models. However, adopting ISO 55000 has helped to align our objectives and services to the asset management strategies of road controlling authorities and to ensure that their goals to realise the best value from assets are well addressed in the service delivery.

This paper discusses how various challenges have been tackled for successful adoption and ISO 55001:2014 certification of our Road Network Asset Management System utilised in network management contracts in New South Wales, Victoria and Tasmania. Use of our asset management framework, together with a state of art Asset Management Information Solution (AMIS) suite for managing road network, has resulted in efficiencies in maintenance operation and has permitted us to provide assurance to road agencies that assets have been managed to provide better value from limited resources and assists in fulfilling their institutional objectives.

KEYWORDS: asset management, asset management system, iso 55001, road maintenance, business system.

1 Introduction

Adoption of the best asset management (AM) practices for efficient management of road network maintenance and operation has always been a primary focus of the DM Roads business within Downer's Transport and Infrastructure Division.

A number of initiatives followed by DM Roads in recent years have included:

- Enhancement of inhouse developed enterprise job management system (AMIS Ent) for managing road network asset and operations data
- Better utilisation of business intelligence (BI), with its data visualisation and

analytics capability, to provide up-to-date information to assist in decision making.

- Review of business processes related to service delivery of road network management (RNM) activities for better alignment and standardisation
- Adoption of ISO 55001:2014 Asset Management System standard

The projects on major refinement of AMIS application (Refer to Pradhan *et al* [1] for details) and implementation of BI (Refer to Pradhan [2] for details) were completed by 2017. The project on development of road network asset management system (RNAMS), adopting ISO 5500x standards principles and requirements, was started in May 2017.

The adoption of ISO 5500x standards by Downer aligns with the strategic direction of state highway authorities in Australia who are in the process of adopting these standards.

This paper discusses our RNAMS development journey. The system implemented in RNM contracts in New South Wales, Victoria and Tasmania have been awarded with ISO 55001:2014 certification.

2. Methodology followed

2.1 Challenges

DM Roads provides road network management services for road controlling authorities (RCA) throughout Australia with significantly different legislative, regulatory and technical requirements.

In addition, the limitation of any service provider's influence in managing assets is also dependent on:

- Contract type i.e. alliance, stewardship, performance specified, measure and value etc.
- Scope of services including asset portfolio included in the contract
- Funding availability
- Policy and strategy of a given RCA

A need to cover all the above-mentioned variances in a single asset management system framework provided significant challenge to the project team.

Literature review had shown that there are several guidelines including CEDR Contractor Report [3], IIMM Supplement [4] and numerous others developed by various asset management institutions from different countries were available. However, there was no specific information available in the public domain on AM system complying with the ISO 55001 standard requirements implemented by a private sector service provider who is sharing the management of a road network with the asset owner and other third parties.

2.2 Phase Wise Approach

RNAMS development included:

- Phase 1: Implementation of RNAMS in one matured network management contract
- Phase 2: Improvement of RNAMS to make applicable for all contracts

The criteria considered for selection of a contract for the first RNAMS implementation included:

- A long-term contract with matured asset management system in place
- A Contract requiring wide range of asset management planning and delivery work activities

North Sydney state highway network performance specified contract (PSMC) was chosen as the pilot contract for RNAMS implementation in phase 1.

Contrary to the first phase, where the emphasis was on having the business system updated to comply with ISO requirements, the second phase was more focused on improving the asset management process and procedures to make it applicable for all the road network management contracts managed by DM Roads.

Hence, two new RNM contracts in different states (i.e. Victoria and Tasmania) with significantly different contractual requirements were selected for Phase 2. Subject matter experts (SME) from DM Roads Asset Management Services were fully involved in asset management activities in these contracts.

2.3 3-Tier System

To ensure that the same AM system can be applied to contracts with significantly varied requirements, it was decided to follow a 3-tier approach (refer to Figure 1).

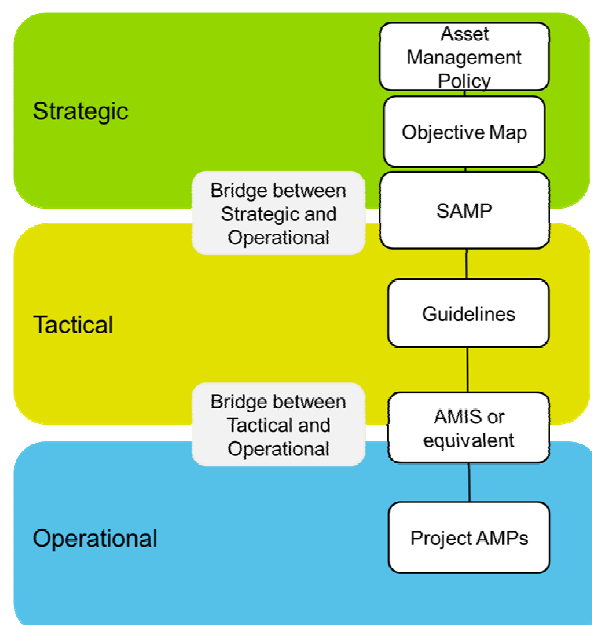


Figure 1: 3-Tier System

Strategic level included Asset Management Policy and Strategic Asset Management Objectives that are applicable for all asset management activities related to RNM's service provision.

Tactical Level included a Strategic Asset Management Plan (SAMP) and various asset management guidelines and procedures which outline DM Roads' way of managing asset.

Operational level included project specific asset management plans, procedures and work instructions. These plans are developed considering contractual requirements as well as RNAMS requirements.

2.4 Gap Analysis

The IPWEA National Asset Management Support (NAMS) Group ISO 55001 maturity assessment model was used to identify the gaps in the AM system implemented in PSMC. Figure 2 illustrates how the tool was utilised in monitoring the progress in RNAMS towards readiness for certification.

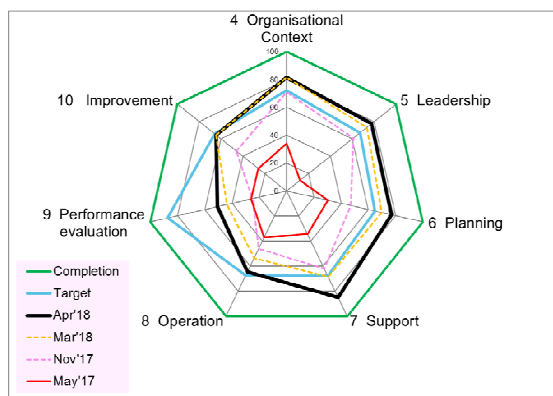


Figure 2: Maturity Assessment

The maturity assessment showed that PSMC has been implementing asset management best industry practices and was providing efficient maintenance services. However, from the business system perspective, there were some deficiencies i.e. lack of properly documented AM business process, technical procedures, AM related training program etc. The performance of the contract heavily relied on the network knowledge and experience of individual personnel. Lack of a properly documented AM system was causing sustainability issue and had shown some degradation in performance whenever a key staff member left the contract team.

2.5 Project Planning

An ISO 55001 certification project was managed by DM Roads' Integrated Contract

Management System Manager (ICMS) manager.

In addition to specialists from business system development area, the team also included technical SMEs i.e. asset management specialist, modeller, information manager, senior pavement engineer, experienced maintenance practitioner etc.

Having a detailed plan with properly schedule workshops, training etc. helped in managing the input and participation of personnel from multiple disciplines across the business.

Proper monitoring and adhering to the plan helped to get the first certification of ISO 55001 within one year from the start of the project.

3 The Journey

Major activities carried in the project implementation are briefly discussed below.

3.1 Research and Development

As there was no experience available in the public domain on the AM system that satisfies the ISO 55001 requirements for public road network managed by private sector a lot of research and consultation etc. was required to come up with an appropriate framework.

Various activities undertaken included:

- review of available literature on the development of AM systems to meet standard requirements
- discussion sessions with personnel who were previously involved with development of a system for ISO certification
- key project personnel attended training courses on advance AM and on ISO 5500x standards

3.2 Policy and Strategy

Review of stakeholder's interest and influence relevant to RNM business service provision, external and internal issues affecting both the achievement of our business goals and the AM system were undertaken. It also included a detailed review of the AM policy and strategic plan of our customers i.e. the road controlling authorities throughout Australia.

An objective map was developed with alignment of the customer goals, Downer's vision and DM Roads' business strategy. It formed the basis for the development of RNM AM policy and strategic AM objectives.

3.3 Business Process Improvement

The AM system requires to integrate with various other systems in place. An example of how AM activities interface to other activities within a project/contract providing RNM services is illustrated in Figure 3.

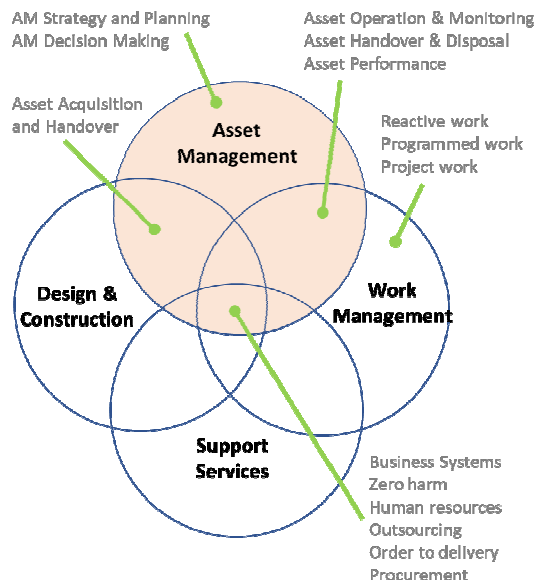


Figure 3: Asset Management Interface

The ISO project team worked together with another ongoing project on business process realignment and standardisation. An effort was made to ensure that all the relevant processes and systems were in place including Downer Integrated Management System, zero harm, financial system etc. and are well aligned and provide synergy to the business.

A number of workshops were held, and subject matter expert (SME) were involved in documenting the process and identifying the required improvements.

3.4 SAMP and Tactical Documents

A Strategic Asset Management Plan (SAMP) was developed to provide an ISO 55001 compliant framework to assist in achieving strategic AM objectives. The process and procedure included in SAMP fully complies with the Downer corporate IMS.

Numerous technical guidelines were developed to provide guidance and streamlining the decision making process in asset management related activities. They were based on industry best practices and, also, collation of experience of Downer employees in different contracts. These guidelines were reviewed and updated in

phase 2 of the project to ensure that they are applicable for all the contracts.

3.5 Project Documentation

RNAMS implementation for a given project started with defining the scope of services, understanding the stakeholders interest and influence and relevant internal and external issues affecting delivery of the contract.

Project specific AM plans and procedures were reviewed and updated considering the contractual requirements, local maintenance practices and best practices recommended in tactical guidelines. Improvements identified were documented and training organised to improve the competency of the personnel involved.

3.6 Informed Decision Making

Up-to-date information for performance monitoring and to assist in decision making process is an integral part of RNAMS system implementation in a contract.

Information needs are generally assessed at the start of a service delivery contract or when there is major change in the scope. The information needs and the process to achieve it is documented in a Data and Information Management plan. It forms the basis for customisation of AMIS, BI and dTIMS applications for a given contract. Necessary training is provided to end users to ensure that the applications are properly used and assisting network operation and maintenance management.

3.7 AM Competency

Different position titles are used in different contracts for personnel working on the same type of activities. Hence, SAMP has defined standard roles and responsibilities for personnel involved in AM activities. Position(s) within a contract are mapped to the relevant AM roles. A training matrix with training identified for each role is maintained by each contract. Downer's Learning and Training (L&T) application is used to maintain the training requirements and completion records. Through a rigorous training program, the awareness of the benefits of proper asset management and competency of the project personnel improved significantly.

3.8 Risk and Opportunity Management

With introduction of RNAMS there was significant improvement in quality of the various registers. The risk registers of each RNM contract is reviewed regularly

considering the standard AM Risk checklist and where appropriate updated. With inclusion of the AM related risks and a regular update regime in place significant improvement in the quality of risk and opportunity register was observed.

In addition, an improvement was made with the stakeholder register, documentation register, business context documentation etc..

3.9 AM Benchmarking

In addition to monitoring of the maturity of the AM system, a separate AM benchmarking tool was developed to monitor the progress in improvement of asset management practices followed by different contracts. The tool is used to benchmark the asset management practice in place in comparison to the industry best practices applicable for a given activity. With a six-monthly review period in place, progress in asset management practice can be monitored and priority areas identified based on the criticality and risk involved.

4 Identified Benefits

With a significant number of external constraints affecting RNM service provision, it is difficult to quantify the benefits of implementing an ISO standard certified AM system.

Some of the major benefits identified include:

- *Sustainable business* – Having systems in place with proper documentation the impact of staff turnover has been lessened and has seen improvement in business continuity
- *Improved asset management* – With proper monitoring and better risk and opportunity management, the asset management processes became more streamlined and continuously improved
- *Standardisation* – After the review of the business process as part of RNAMS development, the processes and procedures were streamlined and improved considering experience from different contracts
- *Better alignment between business systems* – As the AM interfaces with other management processes, the development of an AM System included review of other systems and makes it more compatible.
- *Improvement in effectiveness and efficiency in service delivery* - due to

ongoing performance monitoring and having improvement process in place.

- *Assurance to Customer* - Having systems in place, certified by a recognised international authority, provides better assurance to our customers

5 Conclusions and recommendations

- An AM system based on ISO 55001 standard provides a framework for effective and efficient delivery of services and assists in maximise the value of the asset
- For proper implementation of the asset management system significant effort and resources are required and, hence, leadership commitment is paramount
- Only by developing people culture towards regular monitoring the performance and taking initiative to utilise opportunities to improve the process will ensure that the system provides real value
- Having an AM system in place provides the base framework for ongoing improvement in asset management practices to improve efficiency in service delivery
- Having the ISO certification, with requirements of re-certification and surveillance audits, provides assurance to Customers that the system in place is live. In addition, it provides the business incentive to be more vigilant in implementing and monitoring the system to keep the certification up-to-date.

Acknowledgements

We would like to acknowledge Downer Asset and Data Management Office (ADMO) and Downer Utilities Business for the guidance provided in development of RNAMS.

References

1. N. Pradhan, F. Derrick and A. Wade, 2013, "Utilisation of Maintenance Management System to Improve Efficiency in Maintenance Operation", 14th NZTA/NZIHT Annual Conference, Auckland, New Zealand, Nov 3-5.
2. N. Pradhan, 2017, "Business Intelligence for Efficient Management of Road Maintenance operation", International Public Works Conference, Perth, Aug 20-23,
3. IIMM Supplement, 2015, "Meeting ISO 55001 Requirements for Asset Management", IPWEA, Australia.

4. CEDR Contractor Report 2017-01, "Implementation Guide for an ISO 55001 Asset Management System. A practical approach for the Roads Sector in Europe", Conference of European Directors of Roads, Belgium.
5. N. Pradhan, 2019, "Implementation of Asset Management Standard ISO 55001 for Road Network Maintenance Management Contracts". Road Infrastructure Management Forum, Dunedin, New Zealand, Mar 20-21.