



## *Unit Outline*

# *ASST8502 Asset Management Plan*

*2009*

This unit covers asset management plan development; level of service and capability determination; technical performance and life cycle cost assessment; risk identification and ranking; evaluation of current management tactics on the asset, gap analysis and development of an action plan.

## VERSION CONTROL FOR DEVELOPMENT PURPOSES

Version #	Date of issue	To	Changes resulting from reviewers comments
1	14/3/08		
2	24/11/08		
2.3	3/12/08	SD and MM	

All material reproduced herein has been copied in accordance with and pursuant to a statutory licence administered by Copyright Agency Limited (CAL), granted to the University of Western Australia pursuant to Part VB of the Copyright Act 1968 (Cth).

Copying of this material by students, except for fair dealing purposes under the Copyright Act, is prohibited. For the purposes of this fair dealing exception, students should be aware that the rule allowing copying, for fair dealing purposes, of 10% of the work, or one chapter/article, applies to the original work from which the excerpt in this course material was taken, and not to the course material itself.

© The University of Western Australia 2008

## **CONTENTS**

### **CONTACT DETAILS**

### **UNIT DESCRIPTION**

Introduction  
Goals of the Unit  
Learning Outcomes  
Prerequisites

### **UNIT STRUCTURE**

Key Dates  
Attendance

### **TEXTBOOK(S) AND RESOURCES**

Unit Website  
Recommended/Required Text(s)  
Software requirements

### **TEACHING AND LEARNING RESPONSIBILITIES**

Teaching and Learning Strategies  
Charter of Student Rights and Responsibilities  
Use of Student Feedback

### **ASSESSMENT**

Main assignment – Instructions for Asset Management Plan  
Assessment schedule  
Submission of Assignments  
Assessment Policy  
Standard of Assessment  
Ethical Scholarship, Academic Literacy and Academic Misconduct  
Referencing  
Appeals against Academic Assessment  
Student Guild contact details

## CONTACT DETAILS

Unit Site URL	Web	Web CT: <a href="http://webct6.uwa.edu.au/">http://webct6.uwa.edu.au/</a> Course Material Online: <a href="http://www.library.uwa.edu.au/find_information/course_materials_online">http://www.library.uwa.edu.au/find_information/course_materials_online</a>
Unit coordinator		Dr. Melinda Hodkiewicz
Email		<a href="mailto:Melinda.hodkiewicz@uwa.edu.au">Melinda.hodkiewicz@uwa.edu.au</a>
Phone		08 6488 7911
Fax		08 6488 1024
Consultation Hours		By appointment
Lecture Times		See Key Dates for details
Lecture Venue		Room 1.05 1 <sup>st</sup> floor Mechanical Engineering building

### Unit Coordinator

Dr. Melinda Hodkiewicz  
School of Mechanical Engineering, University of Western Australia

#### Qualifications

BA(Hons) Metallurgy and Science of Materials, Oxford University; PhD(Mechanical Engineering) UWA; C.Eng Chartered Engineer (UK); CMRP, Certified Maintenance and Reliability Professional; MIMMM, Member of Institute of Materials, Minerals and Mining (UK).

#### Current Activities

Melinda is the Discipline Group Leader for the Engineering Asset Management Program at the University of Western Australia. She has coordinated the development and launch of a postgraduate (Masters of Engineering in EAM) program at the University; this program is a joint initiative between the Faculty of Engineering, Computing and Mathematics and the Business School. She sits on the Research Committee of the national CRC for Engineering Asset Management and is Project Leader for a number of industry-funded research and education projects in Asset Management. She is the Academic Program Leader for Rio Tinto's Global Asset Management Professional Development Program.

## UNIT DESCRIPTION

### Introduction

The development of asset management plans is integral to effective asset management. In this unit participants develop an evidence-based plan and recommendations to support an asset or asset class to achieve business goals.

This unit covers asset management plan development; level of service and capability determination; technical performance and life cycle cost assessment; risk identification and ranking; evaluation of current operating and maintenance approach, gap analysis and recommendations.

The unit is integrated into the participant's work environment as the asset or asset class is selected by the participant. It is organised as a project involving a mentor-supported but participant-managed project.

## **Goals of the Unit**

The goal is to develop an evidence-based, risk-assessed AM Plan to ensure level of service delivery for a specific asset or asset class. The structure and composition of the plan will vary depending on the asset class, industry and needs of the specific organisation and stakeholders. Understanding these needs and articulating why items are selected for inclusion in the Plan is one of the main challenges. The resulting document should facilitate communication between the various asset stakeholders and a focus on an agreed set of goals and strategies aligned with the organisation's needs.

## **Learning Outcomes**

On completion of this unit, you should be able to:

- Identify required levels of service for the asset(s) to achieve specific business goals.
- Identify, analyse and display historical performance metrics for the asset relevant to assess capability to meet level of service requirements.
- Summarise cost performance of the asset relevant to determining key life cycle costs relevant for future planning.
- Demonstrate use of concepts in AS4360 to identify and manage risks for the asset.
- Develop a plan for the asset(s) that considers all relevant business factors, not just technical issues.
- Demonstrate a methodical, project-managed approach to AM Plan development.
- Understand how data used in the plan is collected, who is the data custodian, and document where data for the plan is stored.
- Demonstrate critical and constructive reflection on the process of AM Plan development and an ability to identify opportunities for improvement.

## **Prerequisites**

Participants demonstrate deployment of concepts and analytical processes covered in the Engineering Asset Management & Risk, Reliability Engineering and various Management units to develop the asset management plan. Hence it is strongly recommended that students have completed at least the Engineering Asset Management and Risk unit before taking this AM Plan unit.

# UNIT STRUCTURE

## Key Dates

	Week	Mon	Tue	Wed	Thur	Fri	Sat	Sun
Jan	1	26 Class Briefing 6-9 pm	27	28	29	30 ISM* Optional	31	1
Feb	2	2 Submission by 8pm: Project Management Outline	3	4	5	6 ISM* Optional	7	8
	3	9 Submission by 8pm: Level of Service report	10	11	12	13 ISM* Optional	14	15
	4	16	17	18	19	20 ISM* Optional	21	22
	5	23	24	25	26	27 ISM* Optional	28	1
Mar	6	2	3	4	5	6 ISM* Optional	7	8
	7	9 Submission by 8pm: Draft AM Plan (excluding Sections 9 & 10)	10	11	12	13 ISM* Optional	14	15
	8	16	17	18	19	20 ISM* Optional	21	22
	9	23 Class Briefing & Presentation 6-9 pm	24	25	26	27 ISM* Optional	28	29
April	10	30	31	1	2	3 ISM* Optional	4	5
	11	6 Submission by 8 pm: Final AM Plan	7	8	9	10	11	12
	Easter	13	14	15	16	17	18	19
	12	20 Class Briefing & Review 6-9 pm	21	22	23	24	25	26

\* ISM – Optional one-on-one meeting – individually scheduled with advisors (preferably 9-5 pm). Other dates in the week are also available by mutual agreement and depending on availability.

## Attendance

In this unit you demonstrate the ability to work independently on development of the asset management plan. It is nevertheless important to provide regular and timely updates on progress to relevant academic and external advisors. Dates for the submission of specific

project milestones and Class meetings are indicated above and will be confirmed at the project development stage. Class Briefing meeting dates which are compulsory are indicated in bold in the table above.

## TEXTBOOKS AND RESOURCES

### Unit Web Site

There is a unit web site on Web CT <http://webct6.uwa.edu.au/>

### Recommended Text(s)

- *AS/NZS 4360 Risk Management*, AS/NZS: 2004a, Standards Australia.
- *HB436 Risk Management Guidelines*, AS/NZS:2004b, Standards Australia.
- *AS 4536 Life cycle costing – an application guide*, AS/NZS:1999, Standards Australia.
- British Standards Institution. *PAS 55-1 Asset Management Part 1: Specification for the optimized management of physical infrastructure assets*. 2008. ISBN 978-0-580-50975-9.
- British Standards Institution. *PAS 55-2 Asset Management Part 2: Guidelines for the application of PAS 55-1*. 2008. ISBN 978-0-580-50976-6.
- Institute of Public Works Engineering of Australia. *International Infrastructure Management Manual* Version 2.0 2004 or Version 3.0, 2006. ISBN 0-473-10685-X.

A list of useful web sites and recommended additional reading will be available on the Web CT site for this unit. Many relevant books and journal or conference papers are available on-line through Course Materials web page accessed through the University library system.

### Software Requirements

You will need access to a web-linked PC, be able to use word processing, powerpoint and excel software, know how to access recommended reading and other materials on the web and from the University Library system, access WebCT, and have an active email address. There are no specialist software requirements.

## TEACHING AND LEARNING RESPONSIBILITIES

### My responsibilities:

- To guide you through the process of developing an asset management plan
- To create a safe learning environment
- To work with you to ensure that commercial-in-confidence information is protected.

### Your responsibilities:

- To develop a comprehensive project plan and deliver milestones on time.
- To select and develop an asset management plan for a suitable asset
- To attend scheduled classes and organize meeting dates and times as required to support a timely delivery of your AM Plan.

### Charter of Student Rights and Responsibilities

Please refer to the guild website the full charter of student rights, located at <http://www.secretariat.uwa.edu.au/home/policies/charter>

# Use of Student Feedback

All units are routinely evaluated, through the SPOT and SURF surveys, and feedback from participants is taken into account when I reflect on and update the unit. I welcome your comments and feedback on the content, relevance, presentation and methods of assessment for the unit.

## ASSESSMENT

### Main assignment – Instructions for Asset Management Plan

In this assignment you prepare an Asset Management Plan for a specific asset or set of assets with which you are familiar. There is no single right way to structure AM plans, the outline given below has been developed for the purpose of providing a common framework for assessing the assignment. Some of the challenges in this assignment involve determining (1) who is the audience, (2) what information they need and why, (3) how to select an appropriate level of detail for the body of the report and (4) what supporting information needs to go in an Appendix.

This assignment concentrates on those parts of an AM Plan relating to defining asset function(s) and level(s) of service, predicting demand, assessing performance and condition, developing or reviewing risk assessments, assessing current management tactics and developing a gap analysis and action plan. We suggest that the main body of the report (Sections 1-8) is no more than 10 pages of which one page is the Executive Summary; there is no page limit on the Appendices. The appendices should provide appropriate supporting evidence for the information provided in the main report.

#### Executive Summary

The Executive Summary provides an overview of AM Plan. It is an important part of a report and must convey business-relevant information about the asset and the essential recommendations of the report without the support of other material. Please keep executive summary to less than one page.

#### Section 1: Define the audience

Who will read this plan? What do they know about the organization and its strategic objectives? What do they want to know? How will they use the information contained in the plan? For what time period are you developing this plan: is it for the coming year, the next five years or other time period?

#### Section 2: Identify the asset and the system.

Summarise important and relevant factual information about the asset. This should include a summary of the number and value of the assets, asset criticality, scale of maintenance and operational costs, where the assets are in their life cycle, and contracts relating to management of the assets. Clearly define how the asset contributes to the business.

#### Section 3: Identify levels of service required.

A set of clearly articulated levels of service (LOS) criteria creates a foundation on which the AM Plan stands. The level of service criteria selected, how they are measured and the consequences in failure to meet defined LOS, is explored in the rest of the report.

The way in which the required level of service is defined is dependent on the type of asset. Criteria to consider include identification of customer, technical and regulatory/ legislative requirements and Standards with which you need to comply. It is vital to define levels of service that are measurable and linked to specific business outcomes. This section also identifies appropriate performance measures for each level of service defined.

## **Section 4: Predict future demand.**

This section asks you to identify factors and trends that might reasonably influence demand for an asset in the near future. This can be an increase or decrease in demand, load, availability or other factors. This analysis is important in determining if assets need to be upgraded, new assets acquired or significant changes in asset management practices implemented to meet future business needs.

## **Section 5: Assess costs, condition and performance**

This section involves the collection of data from a range of sources and the selection of appropriate graphical and analytical processes to represent the data. It assesses the current condition and performance of the selected asset(s) against metrics that feed directly or indirectly into the LOS criteria identified in Section 3. Aspects which should be considered include but are not limited to age, utilisation, reliability and availability, maintenance and failure history, and condition assessment reports. It may also be useful to compare your information with benchmark information from other similar assets.

It is necessary present an evidence-based view of the life cycle costs of ownership of this asset (asset class). Presentation of LCC information should comply with AS 4536. Various approaches can be deployed in consultation with the project mentors to protect commercial in confidence information pertaining to costs and information pertaining to key performance and failure data.

At the end of this section you must be able to make an assessment of performance against the level of service criteria defined above.

## **Section 6: Risk analysis**

This section provides a summary of the key risk factors associated with this asset with detailed supporting information in the Appendix. You must demonstrate that the processes you use are compliant with the AS 4360 Risk Management Standard.

The complexity of this section is influenced by the type and scale of the asset and its operating context and access to prior risk assessments. For assets for which no prior risk assessment is available, it will be acceptable (for the purposes of this assignment) to set out a process to perform the risk assessment and identify a limited number of high level risks for discussion purposes based on your experience and reference to the literature. For assets with information available then a summary of the main risks will be acceptable and your view on the adequacy of the risk assessment process. Judgment is required here to ensure that you provide an adequate level of detail consistent with the production of a valid and useful AM Plan but avoid getting bogged down in the detail. There is unlikely to be time, for example, for a complete FMEA/FMECA analysis. The analysis should be completed in sufficient depth to identify risks that impact of delivering the required levels of service. A table may be helpful in summarizing the risk information.

## **Section 7: Gap analysis and options development**

Summarise the current management plan for this asset. This should include an overview of current maintenance and inspection plans, the criteria that trigger replacements, acquisitions, and disposal actions, and current practices around the way it is operated.

Conduct gap analysis to determine if the current plan is appropriate to meet current levels of service criteria, future demand and risks identified above. Where gaps exist, identify a list of options for consideration. These options may include but are not limited to investment in new or replacement assets, investment/ retirement to improve performance and/ or efficiency or reduce costs, changes in operational or maintenance strategies, alternative contract management

options, or recommended reduction in levels of service or demand. Develop a set of criteria to rank the options.

Due to commercial in confidence considerations it is not a requirement of this assignment that you provide information relating to future costs or budget allocations for the assets. This would usually form a separate section of the report.

## **Section 8: Action Plan**

Develop a set of recommendations based on the options analysis to ensure that the levels of service for this asset are met for the defined time period. Indicate a priority for the actions.

## **Section 9: Appendices**

Use the appendices to store relevant background, references and additional support material. Clearly identify uncertainties and assumptions in the data presented.

This section should also contain a section that clearly indicates the source of key data used in the report, how it is collected, and who is the data custodian. This will assist others in updating the report in the future.

## **Section 10: Author's Reflection and Review**

In this section please reflect on the process of preparing this report.

Part 1: Please respond in writing and include with your submission, responses to the following questions.

1. Identify two main challenges in preparing the report and describe how you resolved them?
2. Select two data sets from the information in the report. Comment on the quality of the data available to you overall, the ease of data collection, and the assumptions you had to make. What would you recommend/ change to make the process of collecting, analyzing and presenting the data more efficient?
3. What would you change in the structure and contents of the AM Plan? Why?

Part 2: Ask yourself the following questions. We shall discuss your responses to these in the final class session in Week 12.

*Holistic:* How have I considered all aspects of the asset including life cycle phases and functional interdependencies as well as the technical issues?

*Systematic:* How have I demonstrated use of a methodical approach providing a clear and justifiable audit trail?

*Systemic:* How have I demonstrated that my recommendations are appropriate for the system and aligned to the business needs rather than the individual asset in isolation?

*Risk-based:* How are the recommendations appropriate to the identified risks and associated cost/ benefits?

*Optimal:* How have I demonstrated that the recommendations a best-value compromise between performance, cost and risk?

*Sustainable:* How do my recommendations consider the long-term consequences of current activities and plans?

## **General guidelines**

The report is prepared for a business audience. It should be succinct with appropriate use of bullet points, tables and figures. Avoid long sections of text.

Use the most readily available information, further investigation may be required but do not get bogged down in extensive research that does not add significant value to the Plan. Recognise that AM Plans are living documents that will be updated.

Please note that as this is for academic assessment, some sections that may normally be included in an AM Plan are excluded, such as,

1. Identifying who is responsible for the delivery of the Plan;
2. A detailed review of the cost of options and predicting budget forecasts for Plan delivery;
3. Identifying stakeholders involved in the execution of the Plan including in-house delivery partners, supply chain partners and other outsourced suppliers;
4. A detailed assessment of the resources (materials, qualified staff, tools, equipment) available and required to deliver the Plan;
5. Development of processes to enable management of variations in Plan delivery.

## Assessment Schedule

Component	Due Date	Assessment Weight (%)
Submission of Project Management Outline	Week 2	10%
Submit Level of Service requirement summary	Week 3	5%
Submission of Draft AM Plan document for review	Week 7	20%
Class Presentation of AM Plan	Week 9	20%
Submission of Final AM Plan	Week 11	30%
Project Management	Through trimester	10%
Attendance at Class Briefings	As marked below	5%

## Submission of Assignments

Scheduled work should be submitted on or before the due date. Late delivery will impact on the mark awarded for project management and will attract a penalty of 5% per day. This penalty will be waived by the lecturer only in exceptional circumstances. No marks will be awarded to assignments submitted after other students in the class have had their assignments returned.

Assignments should be submitted electronically (by e-mail) on due date or may be handed into the Business School Front Office during business hours before the deadline, a standard cover sheet should be used and a receipt issued.

You are expected to observe the due dates for assignments. Extensions will only be given in extenuating circumstances. Please note that the pressure of work commitments is not generally considered to be extenuating circumstances.

It is our intention that the assignment marking sheets will be returned by e-mail or during scheduled meetings within two weeks of submission. Remember to keep an electronic copy of any work you submit.

## Assessment Policy

*Students are encouraged to read the University's policy on assessment:*

[http://www.teachingandlearning.uwa.edu.au/t14/for\\_uwa\\_staff/policies/teaching\\_learning\\_and\\_assessment](http://www.teachingandlearning.uwa.edu.au/t14/for_uwa_staff/policies/teaching_learning_and_assessment).

## The Standard of Assessment

The Business School and FECM follows the general UWA practice and allocates grades as follows.

- HD (Higher Distinction) 80-100%
- D (Distinction) 70-79%
- CR (Credit Pass) 60-69%
- P (Pass) 50-59%
- N+ (Fail) 45-49%
- N (Fail) 0-44%
- A grade of P or higher is a passing grade for an individual unit.

This unit follows the University of Western Australia's grading system:

HD	(Higher distinction)	80-100%
D	(Distinction)	70-79%
CR	(Credit pass)	60-69%
P	(Pass)	50-59%
N+	(Fail)	45-49%
N	(Fail)	0-44%

Grades are assigned by using the following general criteria which are presented here as a clear indication of the School's expectations. These general criteria may be supplemented by specific standards with regard to a particular assignment.

**HD** The student has a clear understanding of theory, concepts and issues relating to the subject and is able to adopt a critical perspective. The student is able to clearly identify the most critical aspects of the task and is able to offer a logically consistent and well articulated analysis within the analytic framework presented in the unit. The student is able to draw widely from the academic literature and elsewhere but maintains relevance.

**D** The student has a clear understanding of theory, concepts and issues relating to the subject. The student is able to develop an analysis of an issue using the analytic framework presented in the unit and is able to identify and evaluate the critical issues. The student is able to draw upon relevant academic and other material.

**CR** The student demonstrates an understanding of the analytic framework developed in the unit and a partial understanding of concepts and issues. The student is able to identify some key issues and is able to present a logical discussion, but with some conceptual errors or gaps between analysis and conclusions. The student is able to draw upon an adequate range of references and other materials.

**P** The student generally takes a descriptive rather than analytic approach to the subject. The student is able to demonstrate some understanding of the issues involved but does not demonstrate the ability to apply the analytic framework which had been developed in the unit. Draws primarily upon unit materials for referencing.

**N+** The student is unable to demonstrate that he or she understands the core elements of the subject matter. The student is able to provide some insight into issues but misapplies analytic framework developed in the unit, omitting key factors and, for example, drawing conclusions which are not related to the preceding discussion.

**N** The student is unable to demonstrate any understanding of the subject matter. Material presented for assessment is unrelated to unit framework and shows not effort to identify or address critical aspects of the topic.

## **Ethical Scholarship, Academic Literacy and Academic Misconduct**

Refer to the Ethical Scholarship, Academic Literacy and Academic Misconduct and individual Faculty policies. For further information on the rules and procedures in respect of appropriate academic conduct you should visit:

[http://www.teachingandlearning.uwa.edu.au/tl4/for\\_uwa\\_staff/policies/student\\_related\\_policies/academic\\_conduct](http://www.teachingandlearning.uwa.edu.au/tl4/for_uwa_staff/policies/student_related_policies/academic_conduct)

## **Referencing**

It is important that the referencing of any sources used in your written work is done properly, if only to substantiate the points you are making in your assignment or project. The Harvard style is the preferred and there are some notes for guidance which have been prepared by the library staff: 'Citing your Sources Harvard Style'

[www.library.uwa.edu.au/education\\_training\\_and\\_support/guides/how\\_to\\_cite\\_your\\_sources/citing\\_your\\_sources\\_-\\_harvard\\_style](http://www.library.uwa.edu.au/education_training_and_support/guides/how_to_cite_your_sources/citing_your_sources_-_harvard_style)

## **Appeals Against Academic Assessment**

The University regulations relating to appeals and the form on which the appeal should be lodged can be found at

<http://www.secretariat.uwa.edu.au/home/policies/appeals>

## **Student Guild contact details**

The University of Western Australia Student Guild

35 Stirling Highway, Crawley WA 6009

Phone: (+61 8) 6488 2295 , Facsimile: (+61 8) 6488 1041

E-mail: [enquiries@guild.uwa.edu.au](mailto:enquiries@guild.uwa.edu.au)

Website: <http://www.guild.uwa.edu.au>