Information Technology

Support Service

Level II

Learning Guide-34

Unit of Competence: Implement Maintenance Procedure

Module Title: Implementing Maintenance Procedure

LG Code: ICT ITS2 LO2-LG-34

TTLM Code: ICT ITS2 MO2 TTLM 1019v1

LO 2: Revise practices, where appropriate

Instruction Sheet	Learning Guide #34

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Identifying Equipment and software to be maintained and implemented
- Identifying Vendor documentation, peer organizations or research information
- Obtaining user Requirements
- Documenting maintenance procedure

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- Identify Equipment and software to be maintained and implemented processes to ensure future acquisitions of equipment and software.
- Identify Vendor documentation, peer organizations or research information detailing best practices in equipment and software maintenance to improve system performance and reliability.
- Obtain Requirements from user in the area of equipment maintenance and reliability.
- Document Procedures for maintenance based upon best practices.

Learning Activities

1. 1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4,” **in page -1,3&4,6-8 ,10-16,**
4. Accomplish the “Self-check 1, Self-check 2, Self-check- 3, Self-check and Self-check-4 **in page 2,5, 9,17**

Information Sheet -1	Monitoring and reviewing maintenance operation

1.1. Overview of monitoring maintenance operation

The Monitoring Maintenance Lifecycle (MML) is a monitoring development process to reduce maintenance costs and increase reliability of IT infrastructure concerning service recovery related problems. It is based on the classical Waterfall model.

Monitoring Maintenance Lifecycle are methods and standards for improving and mastering maintenance processes, supporting processes and management processes throughout the monitoring lifecycle.

After the procedure is implemented to the organization its progress is measured and its benefit is compared with the previous maintenance mechanism used by that organization.

Ref.

http://www.ibm.com/ibm/environment/news/epro.shtml. 10 IBM Corporate Responsibility Report 2006. http://www.ibm.com/ibm/responsibility/pdfs/IBM_CorpResp_2006.pdf.

Self-Check 1	**Written Test**

Name:_____ Date:_____

Instruction: Answer all the questions listed below, if you have some clarifications- feel free to ask your teacher.

Please ask your trainer the answer key for this Self-Check.

I. Write True if the statement is Correct and False if the statement is Incorrect

1. The Monitoring Maintenance Lifecycle is a monitoring development process to reduce maintenance costs
2. Monitoring Maintenance Lifecycle are methods and standards for improving and mastering maintenance processes
3. Maintenance Lifecycle is based on bone fish model

Note: **Satisfactory rating - 3 points, Unsatisfactory - below 3 points**

You can ask you teacher for the answer key

Information sheet-2	Identifying problem Areas to meet service level agreements

2.1 service-level agreement (SLA)

A service-level agreement (SLA) is a contract between a service provider and its internal or external customers that documents what services the provider will furnish and defines the service standards the provider is obligated to meet

- **Why are SLAs important?**

Service providers need SLAs to help them manage customer expectations and define the circumstances under which they are not liable for outages or performance issues. Customers can also benefit from SLAs in that they describe the performance characteristics of the service, which can be compared with other vendors' SLAs, and also set forth the means for redressing service issues -- via service credits, for example.

For a service provider, the SLA is typically one of two foundational agreements it has with customers. Many service providers establish a master services agreement to establish the general terms and conditions in which they will work with customers. The SLA is often incorporated by reference into the service provider's master services agreement. Between the two service contracts, the SLA adds greater specificity regarding the services provided and the metrics that will be used to measure their performance.

- **What goes into an SLA?**

In broad terms, an SLA will typically include a statement of objectives, a list of the services to be covered by the agreement and will also define the responsibilities of the service provider and customer under the SLA.

The customer, for example, will be responsible for making a representative available to resolve issues with the service provider in connection with the SLA. The service provider will be responsible for meeting the level of service as defined by the SLA. The service provider's performance is judged according to a set of metrics. Response time and resolution time are among the key metrics included in an SLA, since they relate to how the service provider deals with a service interruption.

- **Penalties: Repercussions for breaking terms**

In addition to establishing performance metrics, an SLA may include a plan for addressing downtime and documentation for how the service provider will compensate

customers in the event of a contract breach. Service credits are a typical remedy. Here, the service provider issues credits to the customer based on an SLA-specified calculation. Service providers, for example, might provide credits commensurate with the amount of time it exceeded the SLA's performance guarantee. A service provider may cap performance penalties at a maximum dollar amount to limit exposure.

The SLA will also include a section detailing exclusions, that is, situations in which an SLA's guarantees -- and penalties for failing to meet them -- don't apply. The list might include events such as natural disasters or terrorist acts. This section is sometimes referred to as a force majeure clause, which aims to excuse the service provider from events beyond its control.

Who needs a service-level agreement?

SLAs are thought to have originated with network service providers, but are now widely used in a range of IT-related fields. Companies that establish SLAs include IT service providers, managed service providers and cloud computing service providers. Corporate IT organizations, particularly those that have embraced IT service management (ITSM), enter SLAs with their in-house customers -- users in other departments within the enterprise. An IT department creates an SLA so that its services can be measured, justified and perhaps compared with those of outsourcing vendors.

Referencies

//www.intercai.co.uk //www.tmfcentral.com. Do treat it with care though.

Self-Check 2	Written Test

Name:_____ Date:_____

Instruction: Answer all the questions listed below, if you have some clarifications- feel free to ask your teacher.

Please ask your trainer the answer key for this Self-Check.

I. Write True if the statement is Correct and False if the statement is Incorrect

1. A service-level agreement (SLA) is a contract between a service provider and its internal or external customers
2. . The service provider will be responsible for meeting the level of service as defined by the organization.
3. The service provider's performance is judged according to a set of metrics.
4. The SLA is often incorporated by reference into the service provider's master services agreement

Note: **Satisfactory rating - 3 points, Unsatisfactory - below 3 points**

You can ask you teacher for the answer key

Information Sheet 3	Assessing Change in consultation

. Why change is required in some system?

Changes are often implemented in an organization if something is not functioning correctly, or if production or quality is not at the expected level. After a change has been implemented, the organization needs to analyze and assess the change to determine if it has produced negative or positive results.

3.2. Possible Indicators for Assessing changes Maintenance procedures

- Are equipment and infrastructure reliable?

    - ✓ How many maintenance incidents were there per workstation/server during the current academic year (by cause, category, and location)?
    - ✓ What was the average number of downtime hours per workstation/server during the current academic year?
    - ✓ What is the average number of calls to help desk/tech-support services per workstation/server?
    - ✓ What is the average elapsed time between the receipt of a call to the help desk and the response call to the end user?
    - ✓ What is the average elapsed time between the initial response call and the notification of problem resolution?

- Are appropriate preventive maintenance procedures in place?

    - ✓ Has a preventive maintenance schedule been established?
    - ✓ Has a preventive maintenance checklist been provided to all end-users?
    - ✓ Has access to frequently asked questions (FAQs) been provided to support staff and end users alike?
    - ✓ Has access to user manuals been provided to end users?
    - ✓ Are file backup procedures in place?
    - ✓ Are disaster recovery procedures in place?

- Are update and replacement procedures in place?

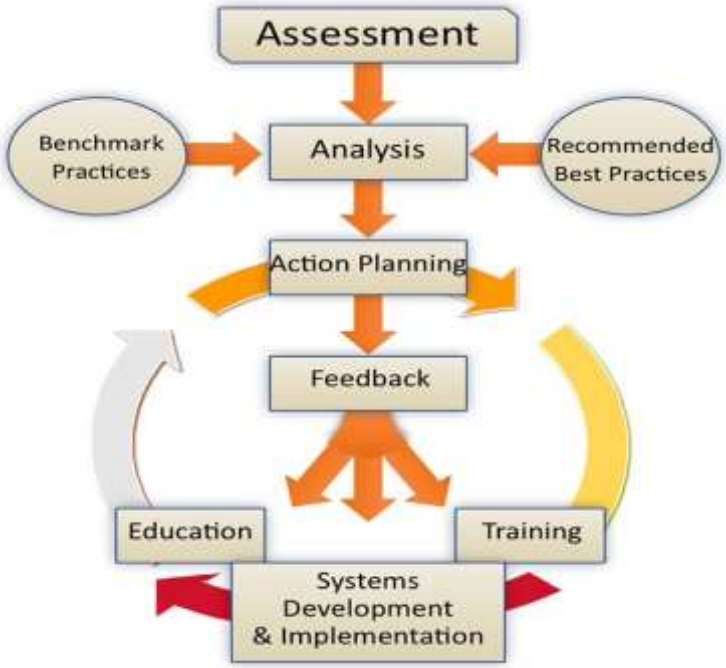
    - ✓ Has a replacement/upgrade schedule been established for hardware?
    - ✓ Has a replacement/upgrade schedule been established for software?

- Are diagnostic and repair resources available?

    - ✓ Is help desk support software available (e.g., trouble ticketing, resolution tracking)?
    - ✓ Is diagnostic software available (as appropriate)?
    - ✓ Are appropriate repair instruments/tools available on school premises?
    - ✓ Are basic replacement parts in stock?

3.3. Establishing Maintenance Plans

Automobile manufacturers recommend having an engine tuned and oil changed regularly to keep a car running as efficiently as possible. Similar maintenance is required of a computer system. It is best not to wait until problems arise-avoid problems in the first place! An organization can carry out much of its own routine, preventive maintenance (e.g., checking database size, purging outdated records, and deleting idle user accounts), but in spite of efforts to deliver a high-quality preventive maintenance program, problems will still occur. To deal with them, many organizations have maintenance agreements with outside contractors for fix-it-when-it-breaks service, particularly for hardware. The key factors in these agreements are response time to a trouble call and the availability and proximity of spare parts. In other words, planners need to know how long it will take to get the problems fixed when (not if) they arise.



Ref. Lisa Huddleston

Fig1. Assessment and planning model

Self-Check 3	**Written Test**

Name:_____ Date:_____

Instruction: Answer all the questions listed below, if you have some clarifications- feel free to ask your teacher.

Please ask your trainer the answer key for this Self-Check.

I. Write True if the statement is Correct and False if the statement is Incorrect

1. Changes are often implemented in an organization if something is functioning correctly

2. After assessment is take place the next step will be analysis

3. After a change has been implemented, the organization needs to analyze and assess the change to determine if it has produced negative or positive results.

Note: **Satisfactory rating - 3 points, Unsatisfactory - below 3 points**

You can ask you teacher for the answer key

Information sheet-4	Designing improvements and implementing maintenance procedures

When a maintenance program is successful, every area of the company is positively affected. Today, top organizations are reaping the benefits from implementing well-designed and managed reliability programs. By implementing the following things you can improve your maintenance procedures

Learn the 12 elements of effective reliability management. Be sure your organization understands these important elements and the impact they have on performance – starting at the very top. Without this leadership focus for your maintenance program, nothing else matters.

Track maintenance metrics. Using metrics and KPIs, maintenance organizations can efficiently manage maintenance activities and focus improvement initiatives on driving value.

Employ maintenance planning and scheduling. With effective planning, work can be completed with the least interruption to operations and the most efficient use of maintenance resources.

Consider an operator-driven reliability program. Without the ownership of your equipment in the operator's hands, it's difficult to be reliable. Using a well-planned approach involving all employees, equipment reliability will have a direct, positive impact on your bottom line.

Improve basic work systems. Many organizations spend too much time searching for new reliability and maintenance concepts, and very little time on implementing and improving what they just started.

Use joint reward systems to drive results. If an organization is serious about a closer integration between departments, the rewards systems must be designed to drive everybody's actions and performance toward the same goal and rewards.

Construct your maintenance plan. Creating a maintenance plan is generally not difficult to do. But creating a comprehensive maintenance program that is effective poses some interesting challenges. what makes the difference between an ordinary maintenance plan and a good, effective preventive maintenance program.

Listen to your equipment. Do you listen to your motors complaining about overload? Do you see your pump packings crying a flood? Do you hear your bearings whine about contaminated lubricants? Do you notice your steam system coughing excessive condensate and complaining about strained elbows?

Stop rewarding failure. Managers can talk all day about the organization's desire to be proactive, improve reliability, reduce costs, etc. But people don't pay attention to what you say; they pay attention to what you do. If you talk "reliability" but pay and recognize for failure, guess what you'll get? What gets rewarded gets done, period.

Target the 60 percent. On average, 30 percent of all preventive maintenance activities do not add value and should be eliminated. Another 30 percent of these activities could be replaced with condition-monitoring technologies and a predictive maintenance approach.

Go all-in with condition-based monitoring. There is little to no payback from using one or two condition- monitoring technologies – or applying CBM to a small amount of your assets and hoping it will evolve into a successful program.

More accurately estimate labor hours. Experience shows that the best labor estimates are routinely off as much as 100 percent. A job estimated to take five labor hours might take as many as 10 hours or as few as two.

Get the right leaders onboard. Corporate reliability leaders say that if they could do it over again, they'd spend more time choosing the right people for key leadership positions. With the right leadership in the right areas pushing the right things, you have success.

Employ a multi-tool approach for more savings. The preventive maintenance team at American Axle and Manufacturing addressed an issue found during a routine preventive maintenance work order using multiple condition monitoring tools.

Build a detailed and accurate equipment list. Despite what you may have heard, the foundation of a successful reliability program is a list – a detailed, accurate equipment list ideally recorded in your CMMS software. It contains the vital information you need to design, develop and engineer your maintenance program from the ground up.

Never accept "good enough". In a maintenance improvement process, there are several areas where there is always a desire or undercurrent to shortcut the process. One of the

most important actions of maintenance and reliability leadership is to expect and set the environment to allow the entire organization to practice “Good Enough Never Is” every day.

Improve work processes. Operating practices are a vital part of any preventive maintenance program. Good practices prevent failures. Poor practices encourage failures. This article discusses sample business practices that must be implemented to improve overall plant reliability.

Use the right predictive maintenance metrics. What gets measured gets improved. Or conversely, what doesn’t get measured never will be improved. Tracking and reporting on key metrics lets you focus squarely on the behavior changes you want.

Create a clear, concise vision. One of the first responsibilities of leadership is to provide a simple, clear view of what the future can and should look like. Having a clear, concise vision to improve your plant is important. This vision must be simple and visible.

Learn root cause analysis techniques. When a reliability problem arises, most organizations either address it at the symptomatic level or seek immediately to lay blame on a person or group. Root cause analysis is a systematic process for understanding and addressing the underlying causes of a problem.

Look, listen, feel, smell. Regardless of whether you're doing inspections with handheld computers or a paper system, can trend data or not, or have key performance indicators or not, you won't be successful unless your people can do quality inspections on equipment.

Decide on a lubrication staffing model. The question of who in an organization should be responsible for day-to-day machinery lubrication tasks is common. Learn the three most common organizational structures and create your own.

Create a planned backlog. The first maintenance scheduling principle is the prerequisite of having a planned backlog. Learn how to prepare and use a schedule as a control standard to improve maintenance productivity.

Use Reliability-Centered Maintenance analysis. A Reliability-Centered Maintenance analysis should be viewed as a serious exercise for your business. An RCM analysis is an investment that takes time, resources and money to complete, but is worth the effort.

Implement Total Productive Maintenance in 12 steps. Implementing TPM using these 12 steps will start you on the road to “zero breakdowns” and “zero defects.” Achieving 100 percent reliability takes discipline and teamwork.

Break out of maintenance budget jail. If you are in budget jail and have tried to get out by preaching reliability to the people above you but have made little headway, here is a plan to break you out.

Learn the value of “P”. Point P on the P-F Curve is where a defect enters a machine. At some time in the future, this will cause a functional loss of some kind. As a defect lingers in a machine, the machine functionality decreases over time. At some point in the future, Point F, total failure of the machine occurs.

Create an equipment bill of materials. An equipment bill of material lists all the components of an asset, including its assemblies and subassemblies. With a reliable equipment bill of materials, a planner can determine exactly what parts are needed. And in an emergency, it provides valuable information to craftsmen and others to ensure that the right parts are identified and procured.

Use P-F intervals to map and avert failures. The P-F interval is a valuable piece of information for any maintenance team, and you don't need special education to use it. The use of P-F intervals in determining the right maintenance to perform at the right time need not be confined to RCM.

Consider a continuous monitoring system. Continuous monitoring is the application of dedicated devices for collecting predictive maintenance-style data to aid in a condition monitoring program. With each passing year, this technology gets cheaper, and the desire for more complex and more robust monitoring gets larger.

Build a strong relationship with operations. To get better at maintenance, you must get better at building a positive relationship with operations. To achieve maintenance excellence, you must have an excellent relationship. This means having maintenance in full alignment with the larger goals of your operations and your company.

Quantify the cost of a functional failure mode. What is the real cost of a failure? Unfortunately, we don't know until after the failure has occurred - and reliability is about avoiding the failure.

Develop standard maintenance procedures. Plants often fail to see the importance of having well-written procedures for most tasks. This article discusses the importance of having good procedures and presents the details needed to develop well-written standard maintenance procedures.

Manage assets by criticality. Through proper construction of the criticality analysis model, reliability engineering will be able to illustrate what reliability enhancements must be made to manage criticality, thus improving their ability to manage assets by criticality.

Teach operators the "Should-Actual Five-Whys" method. Operators in a reliability-focused culture should have a questioning attitude and be very observant. The inclusion of the S-A-5Whys tool in their skill set will benefit the organization by the early identification and resolution of problems, leading to increased asset reliability.

Get more out of your EAM. All EAM systems contain the same basic capabilities in support of your maintenance program. They are like any other software package – their success depends on how they are implemented and, more importantly, how they are used.

Optimize outages with effective task planning. Outages can have elaborate schedules, but often are unsuccessful due to ineffective advanced planning, which results in inefficient work execution and outage schedule overruns. Outages can only be successful when the outage work is planned effectively before the work is scheduled and/or started.

Put multiple CBM tools to use. It is essential to understand how equipment performs in a facility and to be able to predict and prevent failures before they happen. The results of the combination of condition-based monitoring technologies will give the reliability engineer an even greater confidence when communicating to management when an asset is approaching an impending failure.

Apply the correct maintenance strategies. True reliability is achieved when the most cost-effective methods are applied to the assets in your plant, thereby maximizing reliability with the minimum total cost to the business.

Benchmark your lubrication program. Benchmarking provides a much-needed scorecard for areas of lubrication that may not be obvious or often considered for improvement. It is true that we "don't know what we don't know".

Detect machine problems early. This massive list of inspection items will allow you to detect problems early, and hopefully eliminate downtime and/or reduce maintenance costs.

Remove process bottlenecks. If your process bottlenecks are linked closely to the maintenance and reliability of your equipment, it is most likely you have a highly reactive maintenance organization. To move from a primarily reactive regime, significant focus must be placed on developing and deploying systems that move the organization toward being proactive.

Optimize PM tasks. Unfortunately, most preventive maintenance tasks lack the detail that will provide quantitative data for equipment history, and they are written without considering failure modes. The solution is to practice Preventive Maintenance Optimization (PMO), using all aspects to write PM procedures that are value added, comprehensive, repeatable, organized, and specify a correct duration and interval of execution.

Create a lean and effective oil analysis program. Oil analysis is a powerful tool in a maintenance program. This case study presents alternatives to expensive in-house test equipment, good utilization of outside labs, oil storage solutions, methods of reporting findings to further the program, and selling the program to upper management as well as to operations and maintenance.

Put maintenance checklists to use. While most groups will say they have checklists, requiring their use and the accountability are often major factors for success. In your organization, what processes do you have in place to ensure that people use maintenance procedures and checklists?

Avoid the 5 biggest risks. Asset management is an integrated approach to optimizing the life cycle of your assets, beginning at conceptual design, through to usage, decommissioning and disposal. By acknowledging and paying attention to these five primary risks to effective asset management, you can put in place plans to mitigate the effects these might have on their program.

Give maintenance technicians equipment ownership. How do you strike a balance between equipment ownership and building the skills through cross training, and having the ability to get the work done all the time? Is it based on the culture of the organization?

Be smart about kitting. Kitting for maintenance crafts to perform their tasks is one of the easier and more effective ways to allow quality completion of the job with minimal productivity impact, especially when accompanied by a well-planned and functionally scheduled job.

Work towards zero failures. Experiences and data show that zero failures are possible in a maintenance program. As someone once said, “If you think you can’t, you’re probably right. If you think you can, you’re probably right.”

Manage the change process. The most difficult but most beneficial aspect of leading a maintenance and reliability improvement effort is managing the change process in organizations. The behavior change process from a reactive state to a proactive state is a challenging transition for any maintenance program.

Ref.

https://it.toolbox.com/question/brd-template-to-document-functional-customer-requirements-040208

.http://www.techiesbyte.com/2013/04/how-to-write-good-business-requirement.html

Self-Check 4	**Written Test**

Name:_____ Date:_____

Instruction: Answer all the questions listed below, if you have some clarifications- feel free to ask your teacher.

Please ask your trainer the answer key for this Self-Check.

I. Write True if the statement is Correct and False if the statement is Incorrect

1. The most difficult but most beneficial aspect of leading a maintenance and reliability improvement effort is managing the change process in organizations.
2. When a maintenance program is successful, every area of the company is positively affected.
3. Without the ownership of your equipment in the operator's hands, it's difficult to be reliable

Note: **Satisfactory rating - 3 points, Unsatisfactory - below 3 points**

You can ask you teacher for the answer key