

Design for Maintainability

Construction Industry Institute

Guidebook

Implementation Resource 142-2

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Design for Maintainability Guidebook

*Prepared by the
Construction Industry Institute
Design for Maintainability Research Team*

Implementation Resource 142-2

October 1999

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The University of Texas at Austin.

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Introduction

Maintainability is defined as “an inherent characteristic of a system or product design pertaining to the ease, accuracy, safety and economy in the performance of maintenance action; a design parameter related to the ability to maintain.”

Full implementation of design for maintainability will improve project return on investment. This book, produced by the CII Design for Maintainability Research Team, will assist owners by providing specific instructions on using tools for improved design for maintainability. It will help designers and contractors by illustrating methods of integrating maintainability knowledge into project design and construction.

The following steps are suggested:

- 1. Become familiar with the levels of maintainability.** These levels describe the current state of implementing design for maintainability, and range from unorganized to formal and fully institutionalized programs. Understanding the idea of differing levels of maintainability is critical before one can advance to the next step.
- 2. Perform a self-assessment of the current status of your own project or company.** The self-assessment in this book is designed to provide a quick evaluation of the project or company status relative to the various levels of design for maintainability. The self-assessment results indicate where the project or company is with respect to a particular level of maintainability.
- 3. Compare current project or company procedures for maintainability with the best practices.** The list of best practices is a compilation of the best facility maintenance knowledge and experiences currently in use, as well as the processes to integrate this information into the project delivery process. This comparison will identify gaps that must be addressed to improve within the current level of maintainability, or to grow to the next level.
- 4. Compare procedures to the model process.** The model process developed by the research team has clear milestones that are supported in an orderly fashion by best practices. This step helps the user define the “where you want to be” goal for the

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optimal design for maintainability program. The model process is intended to enable the user to plan a course of action and measure progress. Fully implementing this ideal process will maximize the long-term benefits of design for maintainability.

5. **Use appropriate tools to improve.** To provide specific aid in moving towards the model process, a toolbox is presented. The toolbox offers an assortment of sample documents (“tools”) that can be readily adapted to expedite improving design for maintainability implementation. The toolbox is arranged to support the listed best practices. They may be applied individually, independently, or in combination as required.

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Levels of Maintainability

Design for maintainability contains four levels of implementation. Based on the elements in these levels, a model process, or fifth level of maintainability, emerges. The levels are briefly described below.

Level One — Designer Experience is characterized by members of the project design team incorporating maintainability into the project on an ad hoc basis. Maintainability implementation is limited by designer experience. No formal policy or process guides this effort beyond individual expertise. Maintainability is not incorporated into project goals.

Level Two — Corporate Standards is characterized by design standards being established and used to guide the design process, although maintainability is achieved indirectly. The standards are reviewed and revised periodically. Operations and maintenance staff are informally involved in the design process, if at all. Moderate maintainability awareness exists, but implementation is low.

Level Three — Emerging Program is characterized by a formal program to incorporate maintainability into project design. Maintainability is recommended and becomes an important design parameter. A documented process is used to implement maintainability. Project cross-functional team meetings include the maintenance staff. Management awareness of the barriers and benefits of maintainability increases and a maintainability sponsor is established. Full corporate commitment to implement maintainability, however, is lacking.

Level Four — Formal Program is characterized by a full corporate commitment in addition to a mature maintainability program. Corporate policy statements require inclusion of maintainability on all projects. In addition, documented processes as well as organizations are devoted to institutionalizing design for maintainability. The maintenance staff fully participates in all project phases. Methods such as life cycle cost analysis are used to make maintainability decisions. Designers and project reviewers use maintainability checklists. Also, a project “lessons learned” database is established and made accessible to all project participants.

Level Five — Comprehensive Process represents the ideal process. It is characterized by the attributes of level four along with a formal corporate process to track maintainability objectives and measures. Lessons learned are compiled into a database to support continuous improvement of the process. Overall, maintainability is fully integrated into existing project delivery processes, as are benchmarking and continuous improvement. Feedback at both project and corporate levels is available and occurs throughout the organization.

Figure 1 is a graphic representation of the relationship between the five levels.

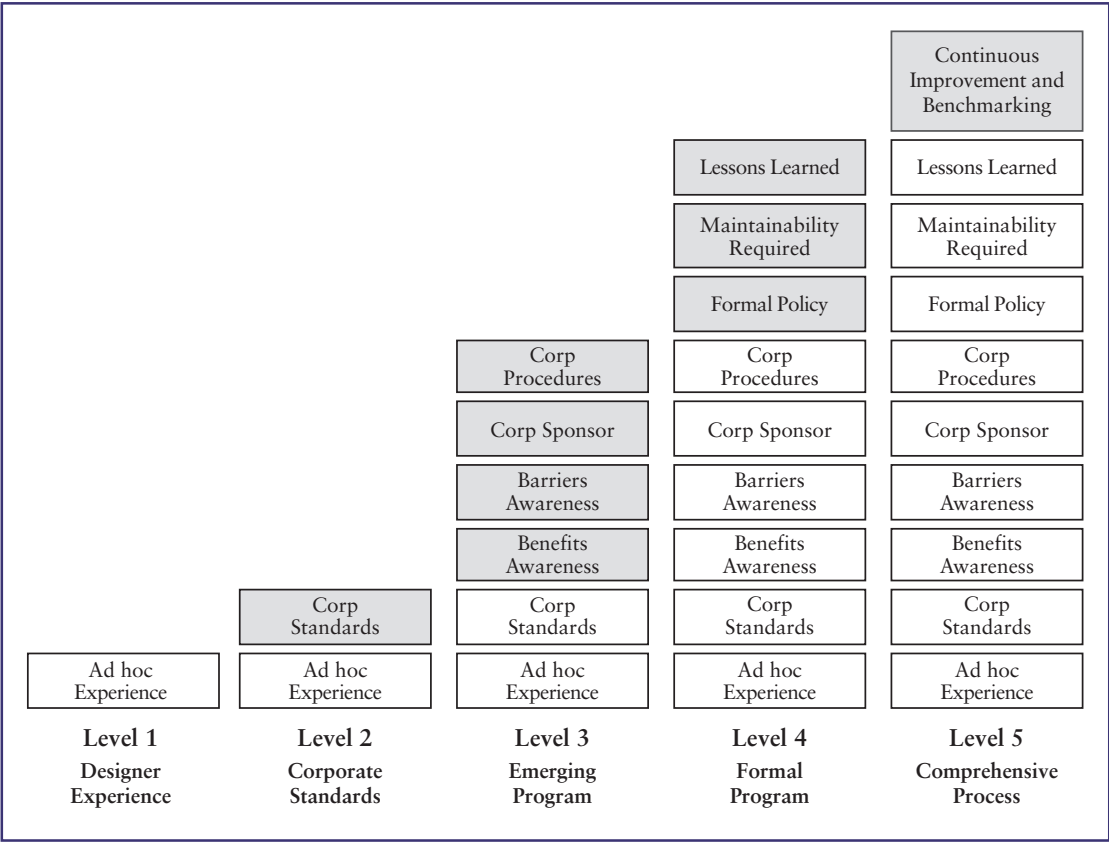


Figure 1. Levels of Maintainability

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Maintainability Self-Assessment

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In Figure 2, a set of statements requests one's level of use corresponding to a numerical score. The scores for each question are totaled. The total score is compared to an implementation "thermometer" to provide an indication of the user's current level of implementation of maintainability relative to known levels.

To use this tool, provide your opinion on the level of use that best corresponds to the situation for your firm or project for each statement. Total the scores for all questions. Compare your total score to the thermometer at the bottom of the sheet.

Interpreting the Score

The total numerical score should place the results in one of the bands of the thermometer. Scores in the ranges listed below indicate the following:

0 to 10 points: You are just getting started with design for maintainability. Perhaps some of your designers are applying their own experience with maintainability to projects. You are clearly at Level 1 and have a long way to go.

11 to 20 points: Some standards for design for maintainability are evident, but no real driver exists to use them. There may even be a policy regarding design for maintainability, but it is not enforced. You are at Level 2.

21 to 60 points: Design for maintainability is a part of your projects. Various elements such as design reviews, checklists, and corporate standards are in general use, and perhaps someone is assigned to encourage their use. You are growing through Level 3.

61 to 90 points: In addition to all the elements listed above, full corporate commitment supports implementing and institutionalizing of design for maintainability. Formal policy statements, maintainability champions, and a rigorous, formal process where each project is thoroughly reviewed for maintainability are all in effect. You are at Level 4 and doing quite well.

CII MAINTAINABILITY SELF-ASSESSMENT					
IMPLEMENTATION ISSUES	Level of Implementation				SCORE
	Never	Some	Mostly	Always	
1. My organization has established a written and widely distributed policy statement directing that maintainability shall be used on all projects.	1	3	7	10	
2. My organization/project has a person responsible for implementing maintainability for each project.	1	3	7	10	
3. My organization has performed a “self audit” to determine the degree that maintainability has been implemented on projects relative to some standard.	1	3	7	10	
4. My organization utilizes maintainability standards for each new facility and/or facility project.	1	3	7	10	
5. My organization/project records maintainability lessons learned from the project in a database.	1	3	7	10	
6. My organization/team has formal maintainability review meetings at all phases of the project.	1	3	7	10	
7. My organization/project uses cross-functional teams to determine maintainability requirements during all phases of the project.	1	3	7	10	
8. My organization/team uses life cycle cost analysis tools to determine maintainability needs on projects.	1	3	7	10	
9. My organization/project applies maintainability lessons learned to continuously improve the process.	1	3	7	10	
10. My organization/project values cost savings from improved maintainability over the life of the facility as much as project first-cost considerations.	1	3	7	10	
TOTAL SCORE					

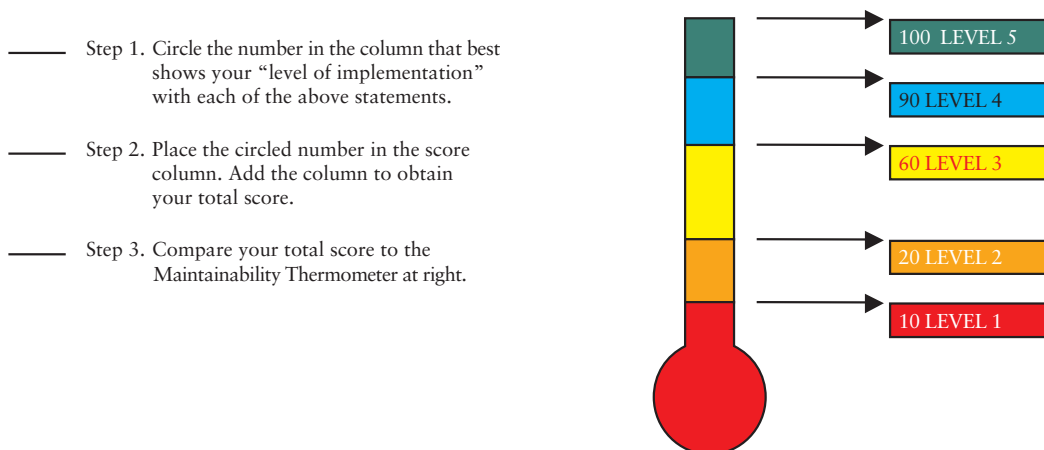


Figure 2. CII Maintainability Self-Assessment

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91 to 100 points: In addition to the full or formal corporate program, you have implemented a continuous improvement process to measure performance, compile lessons learned, and improve the maintainability of the next project. You are at Level 5 and at the head of the class.

At this point the self-assessment has equated a score with a particular level of maintainability implementation. The next step is to determine what attributes are shared for a particular level and what attributes need to be acquired in order to strengthen one's position at a given level or to move to a higher level. Table 1 is provided to assist in this step.

The matrix has each of the levels of maintainability at the top of a column with a brief characterization of the main feature of that particular level of implementation. The columns contain brief descriptions of the attributes that fully describe the level. For example, the nine bulleted items under “Level Three—Developing Maintainability Program” are the attributes that fully describe a level three implementation of design for maintainability. The left-hand column is a list of key elements of an effective design for maintainability program. In fact, the questions on the self-assessment were developed to examine for the presence of these key elements. Moving from left to right across a given key element, the attributes increase in formality.

To use this matrix, one refers to the attributes of the key elements intersecting at each level of maintainability as scored from the self-assessment. In this way the number of attributes common with the user's application can be determined as well as attributes that are lacking to fully achieve a particular level. The matrix is also useful in describing attributes required for advancement to higher levels of design for maintainability implementation.

At this point you should have a fair idea of where you stand with respect to the best in implementing maintainability. The next section is devoted to identifying best practices associated with implementing a better design for maintainability program.

Table 1. Maintainability Self-Assessment Matrix

Key Elements	Level One Maintainability Through Engineering Experience	Level Two Maintainability Through Corporate Standards	Level Three Developing Maintainability Program	Level Four Formal Maintainability Program	Level Five Formal Maintainability Process
Communication of Corporate Maintainability Standard and/or Strategy	- Corporate Standard/Strategy does not exist - Standard/Strategy exist, but not followed effectively	Corporate Standard/Strategy includes some maintainability concepts that are used effectively	- Maintainability Standard/Strategy is not enforced - Informally communicated and understood at the management level	- Maintainability Standard/Strategy Formally communicated - Maintainability policy statement exist	- Maintainability feedback is distributed throughout the organization - Document feedback from all levels of the organization
Utilization of Multi-Discipline Teams	Maintainability is limited by experience of Project Manager or Designer	- Informal maintainability process which may involve O&M personnel. - Standards do not include maintainability checklist	- Cross-functional team meetings including O&M personnel - Maintainability checklist are utilized	- Maintainability meetings with multi-discipline during all phases - Checklist are used by all disciplines	Full integrated and multi-discipline team approach to all phases of a project.
Information System/Technology	Information system does not exist	- Informal feedback only for “lessons learned” - Repair history not captured	Full CMMS data is either not present or not used to make decisions on future projects	- CMMS data is used as input to future design - Developed “lessons learned” database	- Integrated information system fully utilized - Database of “lessons learned” that are communicated electronically
Life Cycle Cost (LCC)	LCC analysis is not considered	LCC strategy is unclear and lacks definition	LCC analysis data is available, but not required	Active use of LCC tools to aid in maintainability tradeoff decisions	Formal tracing of LCC analysis performance
Organization	Disconnects between all phases; planning, design, procurement, construction, startup and operate/maintain	Planning and design phases are integrated	- Planning, design, procurement and construction are integrated - Corporate Sponsor is designated	- Planning, design, procurement, construction, and O&M are integrated - Project Sponsor is designated	All phases are integrated continuously improve
Objectives and Targets	Objectives or targets do not exist	Objective/targets exist but lack implementation	Maintainability objectives/targets are based on type of project	- View effective maintenance as a key contributor to overall profitability - Specific objectives/targets are identified	- Objectives/targets are benchmarked with specific metrics - Part of continuous improvement process

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Maintainability Best Practices

Once the user has determined where they are with respect to the level of maintainability being used within their company or project, the next step is assess and plan for improvement opportunities. This section explains key milestone steps leading to the model process and the best practices.

Users are encouraged to examine the best practices presented and compare them with their existing practices currently followed in the user's organization. By doing so, they will see gaps in best practices at their current maintainability level. The user can then determine the best practices appropriate to enhance the implementation of design for maintainability.

The best practices are divided into two sections: corporate level and project level.

Corporate-Level Program

First Milestone — Corporate Commitment: The catalyst for implementing design for maintainability is a corporate commitment to develop and follow a formal process throughout the organization. This is the first step in the model process. The following maintainability best practices emerge as critical characteristics of this milestone.

Best Practice (BP)-1, Understanding Maintainability: The corporate commitment begins with appropriate senior management achieving a reasonable understanding of the concepts, methods, and objectives of implementing design for maintainability.

BP-2, Self-Audit: The current status is identified by performing a self-assessment to determine current status against known benchmarks and to identify barriers to being “best in class.”

BP-3, Return on Investment (ROI) Impact: A prime motivation for moving forward with maintainability results from assessing and recognizing the economic benefits of implementing a higher level of design for maintainability.

BP-4, Corporate Policy: The way forward begins with the development of a formal corporate policy statement on implementing design for maintainability on all projects. It is vital that the policy language require all players in the process to “walk the talk” for this process to be fully implemented.

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Second Milestone — Establish a Corporate-Level Maintainability Program: This is a straightforward process involving a commitment of both human and financial resources to achieve a consistent process of implementation using standard procedures throughout the organization.

BP-5, Maintainability Sponsor: Stewardship of the maintainability program is assigned to an individual or staff dedicated for this purpose. This establishes a “Corporate Maintainability Sponsor or Champion.” This individual should have design, construction, and operations experience and be empowered to implement the maintainability program.

BP-6, Maintainability Procedures: The maintainability sponsor oversees the development of corporate maintainability procedures. These procedures are best developed from a logical organization of best practices. The procedures result in consistent, standard activities throughout the organization. The sponsor, supported by management, also works to implement these procedures with the help of the maintainability team.

BP-7, Maintainability Team: A support organization should be developed and be comprised of key personnel to expedite implementing the maintainability procedures throughout the organization. The team should include project-level as well as corporate-level members.

BP-8, Lessons Learned Database: A corporate lessons learned database to record and archive important maintainability learning for the benefit of the entire company must be developed, maintained, and made readily accessible to project staff and other interested employees.

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Project-Level Program

Third Milestone — Obtain Maintainability Capabilities: This section of the model process moves from the corporate to the project level. Here, design for maintainability becomes directly engaged in the project delivery process. Reaching this milestone by following the supporting best practices means that the project is enabled to support and implement design for maintainability.

BP-9, Project Sponsors: A project-level maintainability sponsor is identified and chartered. This person has the responsibility to ensure that design for maintainability is integrated into the project and to measure the effectiveness of implementing design for maintainability.

BP-10, Project Maintainability Orientation: A major duty of the maintainability sponsor is to orient the project team into the philosophy of design for maintainability. This can be accomplished by presenting company goals, policies, and procedures, and by acquainting the project team with the checklists and other documents the team will be using throughout the project. It may be appropriate to enter into a partnering agreement with the project stakeholders to implement maintainability.

BP-11, Project Resource Commitment: The maintainability sponsor facilitates the project team in identifying resources to perform maintainability reviews during the life of the project. A vital step in this process is to obtain team consensus on committing these resources to support the maintainability needs of the project.

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Fourth Milestone — Plan Maintainability Implementation: This step finds the resources committed and process enabled. Reaching this milestone is indicated by the formation of a cross-functional project team with resident maintainability expertise. This team develops the maintenance strategy and the project maintainability objectives, and considers appropriate maintenance technologies to integrate into the project design.

BP-12, Cross-Functional Teams: Cross-functional teams in this context may be the project team augmented with maintainability expertise or a subset of the project team including stakeholders responsible for implementing maintainability on the specific project. One of the initial responsibilities is to acquaint the project team with the maintainability policy, the maintainability process, and the roles and responsibilities of the full team members regarding implementing maintainability on the project.

BP-13, Maintainability Goals: The project cross-functional team defines the maintainability goals for the project with respect to equipment operational criteria, design reviews, startup, and performance tracking. In general, these goals should be clearly written, measurable, challenging, and achievable.

BP-14, Maintenance Strategy: The project cross-functional team defines the maintenance strategies for the operation of the facility after project turnover. These may include maintenance techniques, identifying critical items, available maintenance resources, and defining maintenance needs. These elements are combined into an overall strategy.

BP-15, Operational Integration: The project cross-functional team refers to the maintenance database for relevant design information. Project design should include provisions for a maintenance management system as part of the requirements for information turned over to the operations personnel at startup. This team also defines the roles of existing and emerging maintenance technologies for the project. These technologies are important for determining the appropriate baseline equipment condition data to be obtained and submitted to the operations staff. Integrating these elements as part of the project design process, in general, results in a more cost-effective installation as opposed to retrofitting of the same technology.

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Fifth Milestone — Implement Maintainability: This step finds all the elements in place to implement design for maintainability. Within this step are the best practices that actually implement maintainability on all phases of the project — design, procurement, construction, startup, and review. Maintainability concepts are applied to the design considered during procurement, recognized during construction, taught during owner staff training, and evaluated at project conclusion.

BP-16, Formal Meetings: During the life of the project, formal meetings are devoted to discussing maintainability concepts related to design and construction. These meetings are critical for ensuring that important maintainability issues are fully discussed and resolved. It is highly recommended that these meetings begin early in the project process, when the ability to influence project outcomes is high.

BP-17, Design Checklists: During design and project reviews, design/review checklists specifically for maintainability are developed and used. This helps standardize the process company-wide, expedites the process for each project, and feeds into a standard lessons learned database.

BP-18, Project Metrics: Metrics are developed and tracked during the project to measure achieving maintainability on the project. The metrics evolve directly from measurable goals and form the basis for evaluating the level of maintainability.

BP-19, Project Lessons Learned: Lessons learned on the project are formally documented and reported. They become part of the project file as well as being reported to the corporate lessons learned database. It is suggested that if the corporate “lessons learned” file is well developed, the various project files could be reported directly to this database, thus eliminating the need for a stand-alone project file.

Full Circle — Back to the Corporate Program

Sixth Milestone — Update the Corporate-Level Program: The critical element that distinguishes the model process is establishing the feedback mechanism as a driver for continuously improving design for maintainability. This is the last step in implementing the corporate-level maintainability program.

BP-20, Maintainability Metrics: This begins with the ability to evaluate the effectiveness of the current program. Based on maintainability program goals, metrics are established using parameters that measure effectiveness in achieving overall corporate goals. In addition to metrics, lessons learned contribute to evaluating effectiveness and serve as elements for making revisions to the program. In effect, “lessons learned” can function as a subjective measure of program effectiveness and should be considered as elements of the maintainability metrics.

BP-21, Implement Learning: After measuring and analyzing program effectiveness, apply the new information to revise/improve existing procedures and methods. In this step, the conclusions as well as the more subjective lessons learned data can be applied directly to improving the existing program.

BP-22, History File: The recommendations stemming from the program effectiveness evaluation are incorporated into the corporate lessons learned file. The purpose of the file is to provide a central location for recording the lessons learned and to provide an easily accessible data bank for future reference. This can be accomplished with hard copy volumes or with an electronic database.

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The Model Process

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The model process for implementing maintainability is organized to achieve a logical flow. Figure 3 portrays six steps that serve as an overall corporate template for all projects. The process begins with the corporate-level groundwork necessary to implement a new program, and then feeds back learning from the projects to improve the entire process. The steps in the model process are described in the following paragraphs.

Step one, corporate commitment to implement maintainability, is characterized by understanding maintainability, performing a self-assessment to establish a benchmark and goals, performing cost/benefit analysis, and developing a corporate maintainability policy.

Step two, establishment of a corporate maintainability program, is characterized by appointing a corporate maintainability sponsor, developing corporate procedures, and establishing a support organization and library for corporate maintainability knowledge.

In step three, maintainability capability is established. Here, the corporate level overlaps with the project level. With corporate support, a maintainability sponsor is appointed, the project team is appraised of the maintainability program, and resources are identified and committed for project maintainability reviews.

Step four involves the practical application of corporate maintainability concepts and policies to the project. As part of the project conceptualization, cross-functional teams are identified and committed, the project maintainability objectives and maintenance strategies are identified, and maintenance best practices are integrated into the design and construction process.

Step five is the implementation of maintainability. In this step the project team is responsible for several functions. These include conducting formal maintainability meetings, using maintainability checklists, developing project maintainability metrics, evaluating the effectiveness of implementing maintainability on the project, and formally documenting lessons learned on the project.

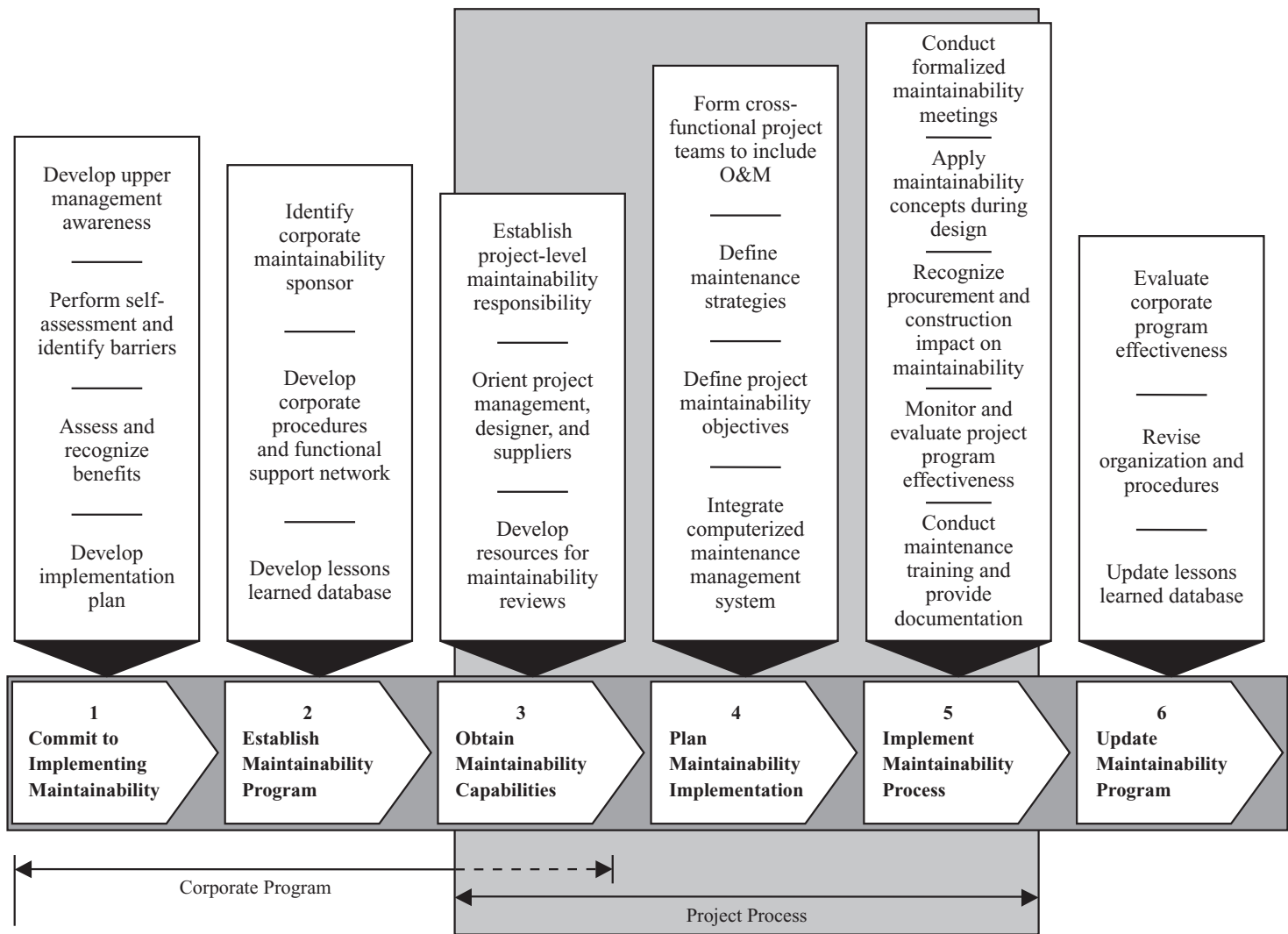


Figure 3. Milestones and Steps of Maintainability Implementation Model Process

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Step six completes the cycle and begins a new one. In this step the project team reports back to the corporate-level program. Project data are used to evaluate the corporate-level program. Based on the feedback, improvements are applied to the corporate procedures and the lessons learned file is updated.

6

Design for Maintainability Tools

The following section contains specific instruments and templates (or “tools”) to aid in implementing maintainability best practices. These are not intended to be a totally inclusive set of techniques to overcome all barriers associated with implementing design for maintainability. Rather, they are a starting point for applying methods and techniques that can be adapted to the user’s specific needs.

The tools are presented in similar fashion to the model process in Figure 3. Each tool is cross-referenced to the maintainability best practice(s) it is intended to support.

Corporate Program Tools

Maintainability Self-Assessment: As explained earlier, the thermometer is the primary tool for mapping out the journey to “best in class” design for maintainability. It is used in support of BP-2, the self-audit. The assessment is intended to provide a quick check of the present status for implementing design for maintainability. The higher the score, the closer one’s program is to the ideal. The self-assessment provides general indications of the overall level of implementation.

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Tool No. 1 — Management Education: To develop corporate commitment to design for maintainability, an understanding of the concept and benefits must be established with senior management.

The tool shown on the next page is intended to elicit top management support and commitment for implementing design for maintainability. This tool is a suggested outline that can be used to develop the proposal for establishing a corporate-level maintainability process. Once the concept is agreed upon, maintainability objectives and benefits that would accrue to the business can be presented. Some detail on specific methods should be presented to begin to create an expectation on the amount of resources required to implement the process. Information on benchmarking by others also would be helpful. The presentation should include a recommendation that the process should have the goal of establishing a corporate best practice for maintainability.

Tool No. 1

**Senior Management Maintainability Proposal Outline
(Use to Implement BP-1)**

- I. Concept
 - A. Consensus on maintainability definition
 - B. Flow chart maintainability process
 - 1. Corporate level
 - 2. Project level
- II. Objectives
 - A. Standardized process
 - B. Relationship of maintainability to business performance
 - 1. Reduced life cycle cost
 - 2. Improved project ROI
- III. Methods
 - A. Policy statement
 - B. Maintainability sponsors
 - C. Standard procedures
 - D. Maintainability training for project team
 - E. Integrate maintainability into design process
 - F. Review all projects for maintainability
 - G. Evaluate effectiveness and record lessons learned
 - H. Apply lessons learned
- IV. What others (competitors) are doing
- V. Acceptance of maintainability as a corporate best practice

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Tool No. 2 — Economic benefits of maintainability: Improvement of project financial performance through implementation of design for maintainability is a major driver of the maintainability process. Clearly, most of the maintainability economic benefits will accrue to the owner. Benefits for the contractor, engineer, and supplier organizations also are achievable if they participate in the maintainability process. The following checklist can be used to identify benefits that may accrue to a project as a result of designing for maintainability. Depending on the nature of the owner's business and the type of capital facility project under consideration, other benefits may be added to this list.

It is highly recommended that owner, contractor, engineers, and the project cross-functional team collaborate on completing this checklist. The collaboration will serve as a mechanism to align the parties in partnership for project success and create a mutual understanding of expectations for design for maintainability.

This checklist covers the major factors of maintainability that influence the operations and maintenance costs of a facility that should be considered during project design conceptualization. The project team should be thoroughly aware of the business goals that the project is intended to achieve as the factors on this checklist are evaluated.

The intent of this checklist is to prompt the project planning team into considering the major factors of maintainability as the project concept is developed. The level of analysis of these factors is left to the individual project or business requirements.

Tool No. 2

Maintainability Cost-Benefits Checklist
(Use to Implement BP-3)

	Potential Benefits			Potential Costs		
	Low	Med	High	Low	Med	High
1. Improvement in equipment reliability	☐	☐	☐	☐	☐	☐
2. Increased equipment utilization	☐	☐	☐	☐	☐	☐
3. Improved equipment performance	☐	☐	☐	☐	☐	☐
4. Control of maintenance costs	☐	☐	☐	☐	☐	☐
5. Utilization of technology	☐	☐	☐	☐	☐	☐
6. Control of technology	☐	☐	☐	☐	☐	☐
7. Improvement in employee utilization	☐	☐	☐	☐	☐	☐
8. Improvement in employee capability	☐	☐	☐	☐	☐	☐
9. Safe equipment operation	☐	☐	☐	☐	☐	☐
10. Safe equipment maintenance	☐	☐	☐	☐	☐	☐
11. Compressed project startup duration	☐	☐	☐	☐	☐	☐
12. Other _____	☐	☐	☐	☐	☐	☐

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Tool No. 3 — Corporate Policy Statement: The corporate policy statement formally establishes the importance of design for maintainability to the organization. Policy statements set forth actions that are required by the company staff. By issuing a written policy on maintainability, this concept can be institutionalized in an expedited manner.

A policy statement should include background on the issue and details clarifying the policy statement. A sample policy format and suggested language are shown on the following pages. The suggested text may contain more elements than presently exist in the user's situation. The example policy is directed at supporting the model process and therefore contains all required elements to fully achieve the model process.

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Tool No. 3
Corporate Policy Statement
(Use to Implement BP-4)

COMPANY POLICY DIRECTIVE

Directive No.: 1

Effective Date: October 15, 1997

Responsible Office: Maintainability Management Division

Subject: Maintainability Program Policy

1. POLICY

It is Company policy to accomplish the following:

- a. Establish and document Maintainability operational performance requirements and maintenance concepts for all programs consistent with the Company's business requirements and objectives. These requirements must be based on a clear definition of the business operating environment.
- b. Implement appropriate Maintainability engineering, analysis, construction and operational requirements during all phases of facility project development.
- c. Perform timely and continuous assessment of the progress toward achieving maintainability performance requirements using appropriate metrics. Problem and failure reporting, tracking, analysis, and corrective action shall be utilized throughout the life cycle of the product to support these assessments. Maintainability data shall be used to support related program analyses, such as safety, logistics, availability, life cycle, and maintenance analyses.
- d. Emphasize implementing Maintainability improvements in each succeeding generation of facility projects.

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2. APPLICABILITY

- a. This Policy applies to all Company organizations and facility projects.
- b. Implementation of policy requirements on facilities shall be in accordance with Procedures and Guidelines Document, (such as) “Facility Project Implementation Handbook.”
- c. Application of these policies to existing contracts, programs, and/or projects shall be to the extent practicable. The maintainability/maintenance provisions of these policies do not apply to systems where a documented decision has been made that service or maintenance will not be required.

3. AUTHORITY (Include if appropriate)

4. REFERENCES

- a. Include as appropriate.
- b. Maintainability Lessons Learned Information System (MLLIS).
URL:
- c. Company Technical Memoranda

5. RESPONSIBILITY

- a. The Company Maintainability organization or Maintainability Sponsor:
 - 1. Establishing policies and preferred methodologies and standards for the application of Maintainability.
 - 2. Providing oversight to assure that Maintainability processes are incorporated effectively in all programs, including integration with program safety and logistics (including maintenance) activities.
 - 3. Performing independent assessments of the implementation and effectiveness of Maintainability processes and tools used in projects.
 - 4. Assuring that the Company MLLIS database system for the collection, retention, and retrieval of Maintainability-related lessons learned and preferred practices is maintained and accessible.