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A Description of the Systems Engineering Capability Maturity Model Appraisal Method Version 1.1

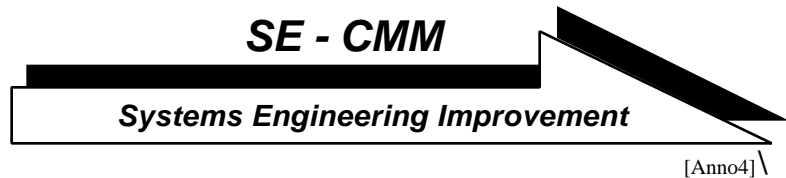
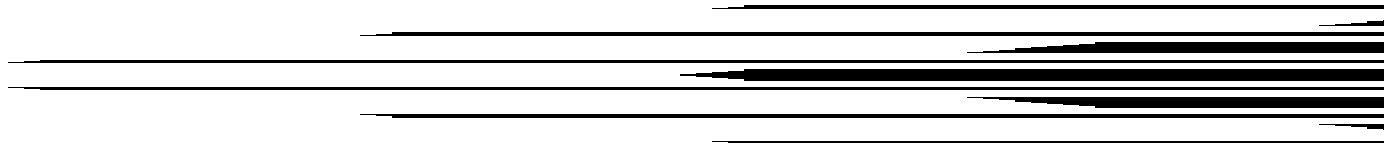
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**Systems Engineering
Capability Maturity Model Project**

March 1996

Handbook
SECM-94-06
CMU/SEI-96-HB-004
March 1996

[Anno3] **A Description of the Systems
Engineering Capability Maturity
Model Appraisal Method
Version 1.1**



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Review and Approval

This report has been reviewed and is approved for publication.

FOR THE COMMANDER
(Signature on file.)
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Table of Contents

To the Reader		vi
Chapter 1:	Introduction to the SE-CMM Appraisal Method	1-1
1.1	Summary of the SE-CMM Appraisal Method	1-2
1.2	Assumptions	1-9
1.3	Appraisal Roles	1-10
1.4	Appraisal Instruments	1-14
Chapter 2:	Summaries of SAM Process Elements	2-1
2.1	Preparation	2-3
2.1.1	Obtain Sponsor Commitment	2-6
2.1.2	Select Appraisal Parameters	2-8
2.1.3	Plan Appraisal Details	2-10
2.1.4	Collect Questionnaire Data	2-12
2.2	On Site	2-14
2.2.1	Conduct Opening Meeting	2-20
2.2.2	Familiarize Team with SAM	2-22
2.2.3	Analyze Questionnaire	2-24
2.2.4	Interview Systems Engineering Leads	2-27
2.2.5	Consolidate Data from SE Leads	2-30
2.2.6	Interview Practitioners	2-32
2.2.7	Consolidate Data from Practitioners	2-37
2.2.8	Develop Preliminary Findings	2-40
2.2.9	Review Preliminary Findings	2-42
2.2.10	Develop Draft Rating	2-45
2.2.11	Develop Draft Findings	2-48
2.2.12	Present Draft Findings	2-51
2.2.13	Adjust Draft Findings	2-55
2.2.14	Present Final Briefing	2-58
2.2.15	Brief Sponsor (optional)	2-60
2.2.16	Conduct Wrap-Up	2-62
2.3	Post-Appraisal	2-64
2.3.1	Report Lessons Learned	2-66
2.3.2	Develop and Present Action Plans	2-67
2.3.3	Manage Records	2-68
2.3.4	Develop Findings and Recommendations	2-69
Chapter 3:	Guidance on Important SAM Processes for Initiating an Appraisal	3-1
3.1	Using Business Goals in SAM	3-3
3.2	Tailoring SAM Based on Organizational Context	3-4
3.3	Selecting Appraisal Personnel	3-7
3.4	Selecting Projects to Be Appraised	3-9
3.5	Using the Appraisal Questionnaire	3-11
3.6	Developing the Rating Profile	3-15
3.7	Developing Findings	3-25

	Appendices	A-1
Appendix A:	Template for SAM Opening Briefing	A-3
Appendix B:	Template for SAM Final Findings Briefing	A-15
Appendix C:	Data Tracking Sheet and Instructions	A-27
Appendix D:	Sample Schedule for the On-Site Week	A-31
Appendix E:	SAM Training Support	A-43
Appendix F:	Site Coordination Checklist	A-64
Appendix G:	Approved SAM Requirements	A-71
Appendix H:	Traceability Matrix to SEI CMM Appraisal Framework	A-77
Appendix I:	References	A-87
Appendix J:	SAM Questionnaire	A-90

Tables:

Table 1-1. Labor Requirements for an Appraisal	1-4
Table 1-2. Appraisal Phases	1-4
Table 1-3. Relationship of SAM & IPI Activities	1-8
Table 1-4. Appraisal Roles	1-10
Table 2-1. How to Read Process Element Descriptions	2-2
Table 2-2. Summary Description of Preparation Phase	2-4
Table 2-3. Participants for Preparation	2-5
Table 2-4. Participants for Obtain Sponsor Commitment	2-6
Table 2-5. Participants for Select Appraisal Parameters	2-8
Table 2-6. Participants for Plan Appraisal Details	2-10
Table 2-7. Participants for Collect Questionnaire Data	2-12
Table 2-8. Summary Description of the On Site Phase	2-16
Table 2-9. Participants for Conduct Opening Meeting	2-20
Table 2-10. Steps for Conduct Opening Meeting	2-21
Table 2-11. Participants for Familiarize Team with SAM	2-22
Table 2-12. Steps for Familiarize Team with SAM	2-23
Table 2-13. Participants for Analyze Questionnaire	2-24
Table 2-14. Steps for Analyze Questionnaire	2-25
Table 2-15. Participants for Interview Systems Engineering Leads	2-27
Table 2-16. Steps for Interview Systems Engineering Leads	2-28
Table 2-17. Participants for Consolidate Data from SE Leads	2-30
Table 2-18. Steps for Consolidate Data from SE Leads	2-31
Table 2-19. Participants for Interview Practitioners	2-32
Table 2-20. Steps for Interview Practitioners	2-33
Table 2-21. Participants for Consolidate Data from Practitioners	2-37
Table 2-22. Steps for Consolidate Data from Practitioners	2-38
Table 2-23. Participants for Develop Preliminary Findings	2-40
Table 2-24. Steps for Develop Preliminary Findings	2-41
Table 2-25. Participants for Review Preliminary Findings	2-42
Table 2-26. Steps for Review Preliminary Findings	2-43
Table 2-27. Participants for Develop Draft Rating	2-45
Table 2-28. Steps for Develop Draft Rating	2-46
Table 2-29. Participants for Develop Draft Findings	2-48
Table 2-30. Steps for Develop Draft Findings	2-49
Table 2-31. Participants for Present Draft Findings	2-51
Table 2-32. Steps for Present Draft Findings	2-52
Table 2-33. Participants for Adjust Draft Findings	2-55
Table 2-34. Steps for Adjust Draft Findings	2-56
Table 2-35. Participants for Present Final Briefing	2-58
Table 2-36. Steps for Present Final Briefing	2-59
Table 2-37. Participants for Brief Sponsor	2-60
Table 2-38. Steps for Brief Sponsor	2-61
Table 2-39. Participants for Conduct Wrap-Up	2-62
Table 2-40. Steps for Conduct Wrap-Up	2-63
Table 2-41. Summary Description of Post-Appraisal Phase	2-65
Table 2-42. Participants for Report Lessons Learned	2-66
Table 2-43. Participants for Report Appraisal Output to Other Parties	2-67
Table 2-44. Participants for Manage Records	2-68
Table 2-45. Participant for Report Lessons Learned	2-69
Table 3-1. Project Selection Considerations	3-9
Table 3-2. Questionnaire Distribution Table	3-12
Table 3-3. Rating Table	3-17
Table 3-4. Tabular Format Example	3-24

Tables, continued:

Table C-1. DTS Contents	A-28
Table D-1. Sample Labor Requirements for a Five Day Appraisal	A-33
Table D-2. Sample Labor Requirements for a Two+Five Day Appraisal	A-35
Table F-1. Preparation Tasks for Site Coordinator	A-64
Table H-1. Traceability Matrix to SEI CAF	A-77
Table J-1. Steps for Process Areas	A-91
Table J-2. Organizational Terms	A-92
Table J-3. Process Terms	A-95
Table J-4. Questionnaire Distribution Table	A-100

Figures:

Figure 1-1. Diagram of Preparation Phase	1-5
Figure 1-2. Diagram of On-Site Phase	1-6
Figure 1-3. Diagram of Post-Appraisal Phase	1-7
Figure 1-4. Findings Flow	1-14
Figure 1-5. Ratings Flow	1-16
Figure 2-1. Diagram of Preparation Phase	2-3
Figure 2-2. Diagram of On-Site Phase	2-15
Figure 2-3. Typical On-Site Appraisal Schedule	2-19
Figure 2-4. Diagram of Post-Appraisal Phase	2-64
Figure 3-1. Key Influences of Organizational Improvement	3-4
Figure 3-2. Rating Profile Development Process	3-15
Figure 3-3. Condensed Data Tracking Sheet	3-19
Figure 3-4. Pie Chart Example	3-22
Figure 3-5. Bar Chart Example	3-23
Figure C-1.DTS Example Diagram	A-29
Figure D-1. Typical Five Day Appraisal Process Flow	A-31
Figure D-2. Typical Five Day Appraisal Schedule	A-32

To the Reader

Abstract

The purpose of this document is to summarize the major elements of the Systems Engineering Capability Maturity Model (SE-CMM¹) appraisal method (SAM). SAM is a method for using the SE-CMM to benchmark, or otherwise appraise, the process capability of an organization's or enterprise's systems engineering function. The SE-CMM itself is described in SECMM-94-04|CMU/SEI-96-HB-004 [SECMM]. This document describes each step of an SE-CMM appraisal and provides guidance for the preparation and conduct of an appraisal. It also contains background and context information about the appraisal method.

Who should use SAM?

Organizations, enterprises, or projects performing significant systems engineering activities are candidates for using SAM. Organizations involved in systems engineering that need to understand their use and management of common systems engineering practice can use SAM as the starting point for an effort to improve their systems engineering process.

Why was it developed?

SAM was developed to provide the systems engineering community with a publicly-accessible method for preparing for and performing SE-CMM appraisals.

What is the scope of SAM?

Although the basic concepts in SAM are adaptable to most organizational appraisal contexts, the scope of SAM is designed specifically to support the SE-CMM. The activity set for SAM is the same basic set as that used by the SEI CMM-Based Appraisal for Internal Process Improvement (CBA-IPI) method; however, differences from that method also exist in SAM due to the different model representations used by each method. This document is a process description for SAM, not a training manual. Some materials are included that might support appraisal training or the development of appraisal training materials; however, it is *not* the intent of this document to be a substitute for appraisal training.

How should it be used?

The SAM description is written to support facilitated self-appraisal against the SE-CMM as a reference model. This SAM description was not written to meet the needs of a third-party evaluation, although it could be adapted to that environment by experienced appraisers if necessary. Third-party use of the method is not encouraged by the SE-CMM Steering Group as of this version's release.

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¹ CMM and Capability Maturity Model are registered service marks of Carnegie Mellon University.

To the Reader, Continued

Who developed SAM?

SAM was developed by the SE-CMM collaboration members, including Hughes Aircraft Company, Lockheed Corporation, Loral Federal Systems Company, Loral Space & Range Systems, Software Engineering Institute, Software Productivity Consortium, and Texas Instruments Incorporated, as part of their initial effort to support community-wide improvement of systems engineering processes.

Intended audience

The SE-CMM is focused on [Anno6] four primary groups: systems engineering practitioners from any business sector or government, process developers, individuals charged with appraising how specific systems engineering organizations implement their systems engineering processes, and systems engineering managers. Persons with five years or more of experience as a systems engineering practitioner or manager and exposure to formal methods of organization assessment will benefit most from the model and appraisal method.

SE-CMM steering group members

[Anno7] The 1994 Steering Group for the SE-CMM Project has provided both traditional management oversight functions and extensive technical and strategic input to the project, and their individual and collected contributions to the project are appreciated beyond measure. The names and organization of the SE-CMM Steering Group members, as of May 1995, are provided in the table below:

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To the Reader, Continued

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the SE-CMM**

The SE-CMM collaboration members encourage free use of the SE-CMM Appraisal Method Description as a reference for the systems engineering community. Members have agreed that this and future versions of this document, when released to the public, will retain the concept of free access via a permissive copyright notice.

Chapter 1: Introduction to the SE-CMM Appraisal Method

Overview of document

This document contains basic information on the SE-CMM appraisal method (SAM). It is broken into three chapters with appendices:

- Chapter 1 contains basic context information and assumptions used in creating the method.
- Chapter 2 contains descriptions of each of the major process elements of SAM.
- Chapter 3 contains guidance information that is helpful in preparing for and conducting an appraisal.
- The appendices contain templates and instructions for using support tools recommended in SAM, as well as the SAM questionnaires.

In this chapter

The following table provides a guide to the information found in this chapter.

Topic	See Page
1.1 Summary of the SE-CMM Appraisal Method	1-2
1.2 Assumptions	1-9
1.3 Appraisal Roles	1-10
1.4 Appraisal Instruments	1-14

1.1 Summary of the SE-CMM Appraisal Method

Introduction

This section provides a brief overview of important aspects of initiating, preparing, and conducting a SAM. Each of these issues is treated in more depth either in Chapter 2 or Chapter 3.

Appraisal initiation

Appraisals are typically performed in organizations either for self improvement or supplier selection. Since this appraisal method is based on the first release of the SE-CMM, using SAM for supplier selection is not recommended.

Process improvement appraisals can vary significantly depending upon the specific objectives of the appraisal. Appraisal objectives will have an impact primarily on the selection of the participants and the duration of the appraisal period. Factors to consider in formulating appraisal objectives are covered in Chapter 2, Sections 2.1.1-2.1.3.

Typical appraisal purposes

The purpose of appraisal is typically one of the following:

- Identify specific areas for improvement based upon known general areas of deficiency.
 - Confirm known data on systems engineering practices.
 - Obtain buy-in for change from the organization.
 - Confirm process improvement progress and determine new status (typically second or subsequent appraisals).
-

Tailoring appraisal based upon objectives

The appraisal should be tailored to meet the objectives of the organization. Appraisals can be focused on almost any cohesive business unit of an enterprise: a specific project, program, strategic business unit, functional organization, multiple functional organizations, or the entire company. The selection is based upon the sponsoring organization's goals. The appraisal can also be focused on addressing all of the process areas, which is typical for an initial appraisal, or it may focus on specific process areas that may have been the target for process improvement. Tailoring the number of process areas and the scope of the entity being appraised (e.g., project, functional organizations, etc.) are the two aspects that will have a significant impact on the duration and resources required for the appraisal.

Specific aspects of the appraisal that can be tailored are addressed in the "Tailorable Parameters" block of each process element described in Chapter 2.

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1.1 Summary of the SE-CMM Appraisal Method, Continued

Recording tailoring information

In tailoring any appraisal method, it is important to note what aspects and parameters of the method have been tailored, so that people who use the data gathered from that appraisal can understand the context from which the data were collected. This tailoring information should be recorded in the appraisal plan.

Results

The primary work products of an SE-CMM appraisal are a findings briefing and an appraisal report. The findings briefing is presented at the end of the on-site period of the appraisal and will include a process capability profile and appraisal findings, which address both strengths and weaknesses of the appraised entity. The weaknesses are typically limited to approximately seven synthesized findings to keep the scope of issues to a number that the organization can manage. The appraisal report is written by the appraisal team after the on-site period; it includes more detail on each of the findings and specific recommendations for process improvement focused on the findings.

Chapter 3 discusses the process capability profile and other aspects of developing appraisal results.

continued on next page

1.1 Summary of the SE-CMM Appraisal Method, Continued

Labor requirements

Table 1-1 defines typical labor requirements for a complete appraisal (e.g., all SE-CMM process areas applied to three to four projects or equivalent). Labor requirements can be tailored as a function of the scope of the appraisal. Typical schedule and labor templates are included in Appendix D. The hours for the facilitator include the time for all phases. The hours for other roles are for the on-site phase only. Descriptions of the appraisal roles are found in the section "Appraisal Roles" found later in this chapter.

Role	Recommended number of people	Hours per person	Total hours for this role
Facilitator	2	60-76	120-152
Appraisal team member (in addition to facilitators)	4-6	50-66	200-396
Systems engineering leads	1 per project (3 projects)	6-8	18-24
Practitioners from across organization	30 (3 groups of 10)	6-8	180-240
TOTAL			518-812

Table 1-1. Labor Requirements for an Appraisal.. Labor Requirements for an Appraisal.; **TC "Table 1-1. Labor Requirements for an Appraisal." \1 1 }**

Phases

Table 1-2 lists the phases of the appraisal process. The process elements for each phase are fully described in Chapter 2.

Phase	Description
Preparation	The activities done in preparation for an appraisal
On-site	The activities done at the site of the entity being appraised
Post Appraisal	The activities done after the on-site appraisal period

Table 1-2. Appraisal Phases.. Appraisal Phases.; **TC "Table 1-2. Appraisal Phases." \1 1 }**

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1.1 Summary of the SE-CMM Appraisal Method, Continued

Diagram of Preparation Phase

Figure 1-1 summarizes the steps in the Preparation phase.

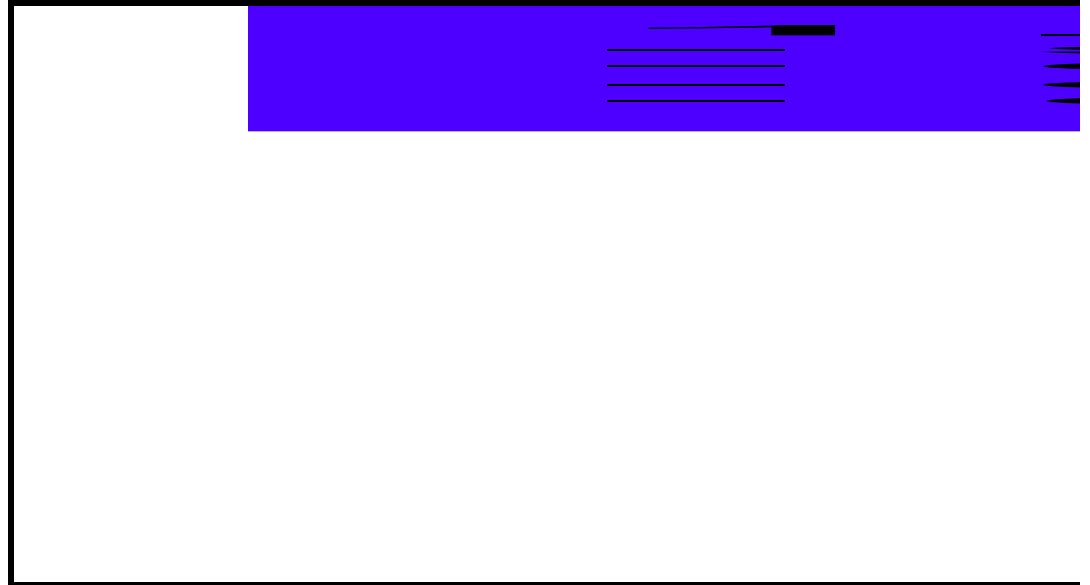


Figure 1-1. Diagram of Preparation Phase.. Diagram of Preparation Phase.;. Diagram of Preparation Phase.:{ TC "Figure 1-1. Diagram of Preparation Phase." \l 1 }

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1.1 Summary of the SE-CMM Appraisal Method, Continued

Diagram of on-site Phase

Figure 1-2 summarizes the steps in the On-Site phase.

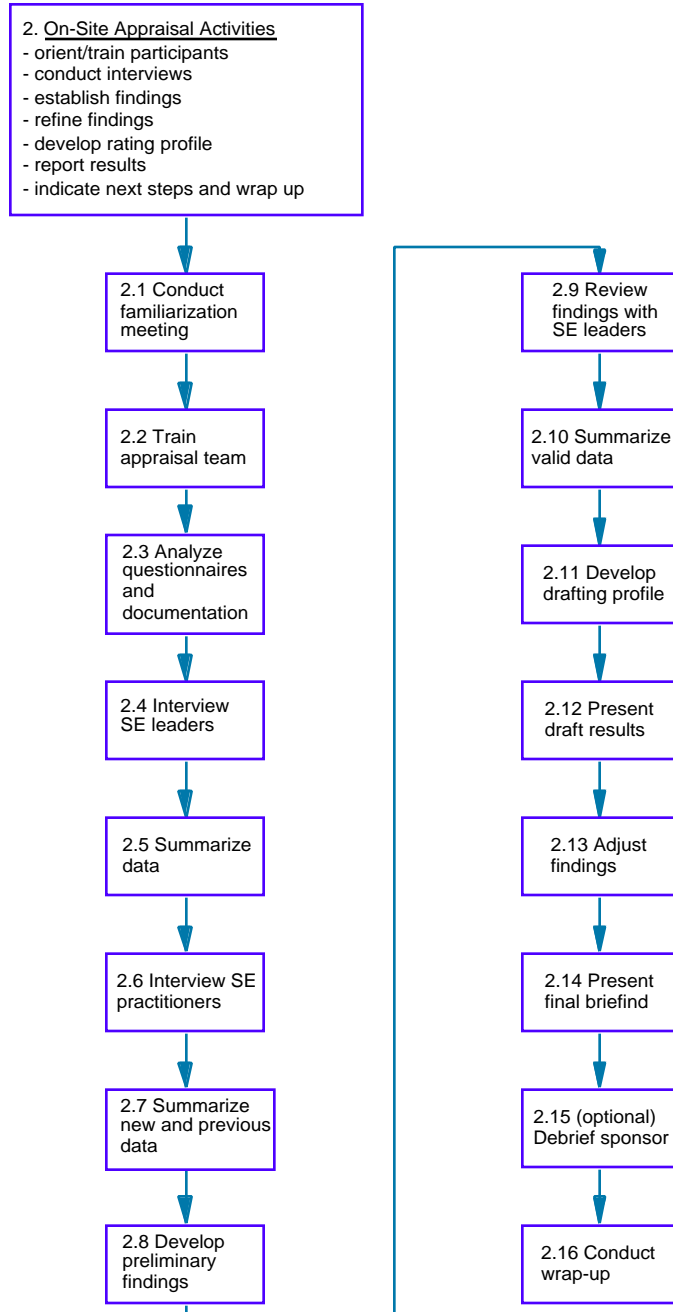


Figure 1-2. Diagram of On-Site Phase.. Diagram of On-Site Phase.;. Diagram of On-Site Phase.;;{ TC "Figure 1-2. Diagram of On-Site Phase." \l 1 }

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1.1 Summary of the SE-CMM Appraisal Method, Continued

Diagram of Post-Appraisal Phase

Figure 1-3 summarizes the steps in the Post-Appraisal Phase.



Figure 1-3. Diagram of Post-Appraisal Phase.. Diagram of Post-Appraisal Phase.;. Diagram of Post-Appraisal Phase.;;{ TC "Figure 1-3. Diagram of Post-Appraisal Phase." \ 1 }

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1.1 Summary of the SE-CMM Appraisal Method, Continued

Relationship to CBA-IPI

For those readers familiar with the SEI CBA-IPI method, Table 1-3 shows the correlation between the appraisal steps documented in Chapter 2 and the CBA-IPI method.

SAM Step	IPI Step
1.1 Obtain Sponsor Commitment 1.2 Select Appraisal Parameters 1.3 Plan Appraisal Details	Plan Assessment
1.3 Plan Appraisal Details 2.1 Conduct Opening Meeting 2.2 Familiarize Team with SAM	Prepare for Assessment
1.4 Collect Questionnaire Data 1.5 Analyze Data 2.3 Analyze Questionnaire 2.4 Interview Systems Engineering Leads 2.6 Interview Practitioners	Gather Data
2.5 Consolidate Data from SE Leads 2.7 Consolidate Data from Practitioners 2.8 Develop Preliminary Findings 2.9 Review Preliminary Findings 2.10 Develop Draft Rating 2.13 Adjust Draft Findings	Consolidate Data
2.5 Consolidate Data from SE Leads 2.7 Consolidate Data from Practitioners 2.10 Develop Draft Rating	Review/Revise Data Gathering Plans
2.10 Develop Draft Rating	Make Rating Judgments
2.12 Present Draft Findings 2.14 Present Final Briefing 2.15 Brief Sponsor (optional) 2.16 Conduct Wrap-Up 3.1 Report Lessons Learned 3.2 Develop and Present Action Plans 3.3 Perform Actions	Report results

Table 1-3. Relationship of SAM & IPI Activities.. Relationship of SAM & IPI Activities.;. Relationship of SAM & IPI Activities.;{ TC "Table 1-3. Relationship of SAM & IPI Activities." \l 1 }

1.2 Assumptions

Introduction	This section discusses the underlying assumptions, both procedural and model-based, that are relevant to using SAM.
Assumptions	<p>The SAM description is based on the following assumptions:</p> <ul style="list-style-type: none">• The SE-CMM is the reference model for the SAM.• Readers are familiar with the content and concepts of SECMM-94-04 CMU/SEI-94-HB-04, <i>A Systems Engineering Capability Maturity Model, Version 1.0</i>.• Facilitators intending to use the SAM have been trained in basic organizational appraisal techniques.• Although SAM can be tailored to either self-improvement or supplier selection, the focus and tone of the material is biased toward self-improvement.
SE-CMM as reference model	Although the basic appraisal method described herein shares many features with other organizational appraisal methods, the data gathering instruments and rating development process are specifically related to the SE-CMM. The SE-CMM is fully described in <i>A Systems Engineering Capability Maturity Model, Version 1.0</i> [SECMM]. This document does not contain specific information on the SE-CMM.
Facilitator training	SAM is an appraisal method that makes heavy use of informal knowledge that practitioners provide through a series of interviews and feedback sessions. There are many methods for interviewing and synthesizing data from these types of data sources. Although it is not necessary for all members of the appraisal team to be thoroughly versed in the concepts of organizational appraisal, the appraisal will proceed more smoothly, and is likely to produce better results, if at least one, and preferably two, of the appraisal team members are skilled in the facilitator role for organizational appraisals. The facilitators are included as members of the appraisal team.
SAM focuses on self-improvement	The actual character of each appraisal will differ based on differences in organizations' cultures and other business contexts. The process described focuses on a feedback loop that includes multiple levels of the entity being appraised. This is one of the ways in which the SAM contributes to an overall process improvement focus in the organization. There are many other models for organizational improvement, and most include a benchmarking step that serves to determine the current state of the organization. Many, like SAM, use this benchmarking step as a way to focus attention and resources on the improvement effort.

1.3 Appraisal Roles

Personnel and associated roles

Table 1-4 defines the personnel and associated roles that are typically involved in an appraisal. The responsibilities and functions performed by each of the roles is further defined in Chapter 2. Note that multiple roles may be assigned to one person as appropriate.

Role Name	Description
Appraisal team	<p>The appraisal team consists of those who conduct the appraisal. <i>All of the personnel on the appraisal team should be familiar with the SE-CMM prior to the on-site phase.</i> This group includes the following roles:</p> <ul style="list-style-type: none"> • Facilitator. • Appraisal team leader. • Site coordinator. • Appraisers drawn from the entity being appraised (internal) or customer (supplier selection). <p>The term appraisal team members indicates any of the roles cited above.</p>
Facilitator	<p>Member of the appraisal team who is responsible for</p> <ul style="list-style-type: none"> • Familiarizing the appraisal team with SAM. • Facilitating the appraisal process during the on-site phase. • Providing SE-CMM expertise. <p>The facilitator is often drawn from outside the sponsoring organization.</p>
Appraisal team leader	<p>Individual who is responsible for</p> <ul style="list-style-type: none"> • Presenting the appraisal findings and developing the appraisal report.
Site coordinator	<p>Individual who is responsible for</p> <ul style="list-style-type: none"> • Obtaining facilities for the on-site phase. • Scheduling activities during the on-site week. • Administering and collecting questionnaires. • Ensuring personnel attendance, as appropriate.
Appraiser	<p>An appraisal team member who participates in the data collection, analysis, findings generation, and communication with the participants from the organization (appraised entity).</p>

Table 1-4. Appraisal Roles.. Appraisal Roles.;. Appraisal Roles.;
TC "Table 1-4. Appraisal Roles." \ 1 }

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1.3 Appraisal Roles, Continued

Personnel and associated roles (continued)

Role Name	Description
Appraisal participants	<p>The appraisal participants are the subjects of data gathering in an appraisal. This group includes</p> <ul style="list-style-type: none"> • Project lead systems engineers (or equivalent). • Practitioners (both technical and management). • Support personnel. <p>Participants are the primary sources of data via questionnaires and interviews. Guidance on participant selection is found in Chapter 2.</p>
Project lead systems engineers (or equivalent)	<p>Appraisal participants identified as having responsibility for the systems engineering aspects of a project. The SE lead should have broad knowledge of the full life cycle of product development. The systems engineering leads</p> <ul style="list-style-type: none"> • Complete the SAM questionnaire. • Participate in a series of question and answer sessions. • Are a primary source of feedback on the validity of the findings.
Practitioners	<p>Individuals who perform or support the systems engineering process (direct and indirect, e.g., training, customers, and suppliers). Practitioners are a source of data, primarily via the interview and also as a reviewer of the appraisal findings. They could also include questionnaire respondents.</p>
Appraisal support personnel	<p>Personnel who support the appraisal process. Examples include secretaries and logistics coordinators for the appraisal.</p>
Appraisal customer	<p>Individual or group who defines the objectives, receives the results, and covers the cost of the appraisal. This group includes</p> <ul style="list-style-type: none"> • Sponsor • Management

Table 1-4. Appraisal Roles, continued.

continued on next page

1.3 Appraisal Roles, Continued

**Personnel and
associated roles
(continued)**

Role Name	Description
Sponsor	Individual providing the resources for the appraisal and the commitment to the process improvement effort, in the case of self-improvement. It is particularly important for the sponsor to show commitment by attending both the opening and closing meetings of the on-site phase.
Management	Management of the appraised entity, both at the organization- and project-level. They are recipients of the appraisal findings and the primary role responsible for carrying out improvements suggested by the appraisal.
Appraisal champion	Individual who initiates the dialogue within the sponsor and management groups and obtains the initial sponsorship for the appraisal. The champion usually plays a role in interfacing the site coordinator and the sponsor in removing any obstacles to the appraisal that may be encountered.

Table 1-4. Appraisal Roles, continued.

1.4 Appraisal Instruments.4 Appraisal Instruments;{ TC "1.4 A

Findings

The goal of developing the final findings is to accurately represent the organizations opportunities for process improvement. In order to accomplish this, data is sampled from the organization using three complimentary methods: questionnaire, interviews, and feedback sessions.

The findings evolve throughout the week beginning with the large amount of data from the questionnaire. From this data and data from the interviews, a set of preliminary findings is distilled. After reviewing them with the SE Leads the preliminary findings are further distilled to a smaller set of draft findings. Finally, after reviewing these draft findings with both the SE Leads and the Practitioners, the appraisal team generates the final findings. See Figure 1-4, Findings Flow below.

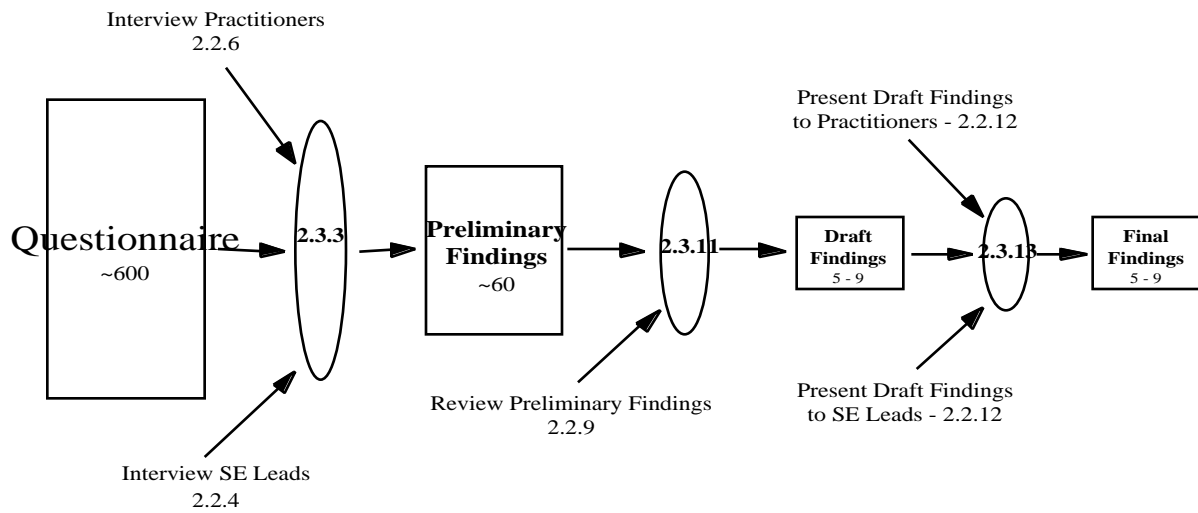


Figure 1-4. Findings Flow.;Figure 1-4. Findings Flow.

**Findings
Development**

As the findings evolve throughout the appraisal, four identifiable products are created. These are described in the following table. (See Appendix J)

Artifact	Role in Appraisal Process
Questionnaires	The questionnaires, representing data from 3 or 4 projects, serve as a starting point for the data gathering process. The questionnaire (see Appendix J) provides a direct link to the SE-CMM model. This large volume of data is entered into the Data Tracking Sheet. (see Appendix C) Analysis of the questionnaire leads to the exploratory questions for the SE Leads.
Preliminary Findings	The preliminary findings are the appraisal team's first attempt at reducing the information that it has gathered (i.e., from the questionnaire, SEI Lead interviews and Practitioner Group discussions) into a Lead interviews and Practitioner Group discussions) into a set of observations. Typically these findings are not well worded, nor do they represent a consensus of the team.
Draft Findings	The draft findings are developed based on feedback that the SE Leads supply based on their review of the preliminary findings. The draft findings are the appraisal team's consensus description of the opportunities the organization has for process improvement. They are carefully worded, and include the finding, an identifiable cause, and a business consequence.
Final Findings	The final findings are developed based on the feedback that the Practitioners and the SE Leads supply based on their independent review of the draft findings. The typical kinds of changes between the draft and final findings are wording changes for community acceptance or clarifications of causes or consequences.

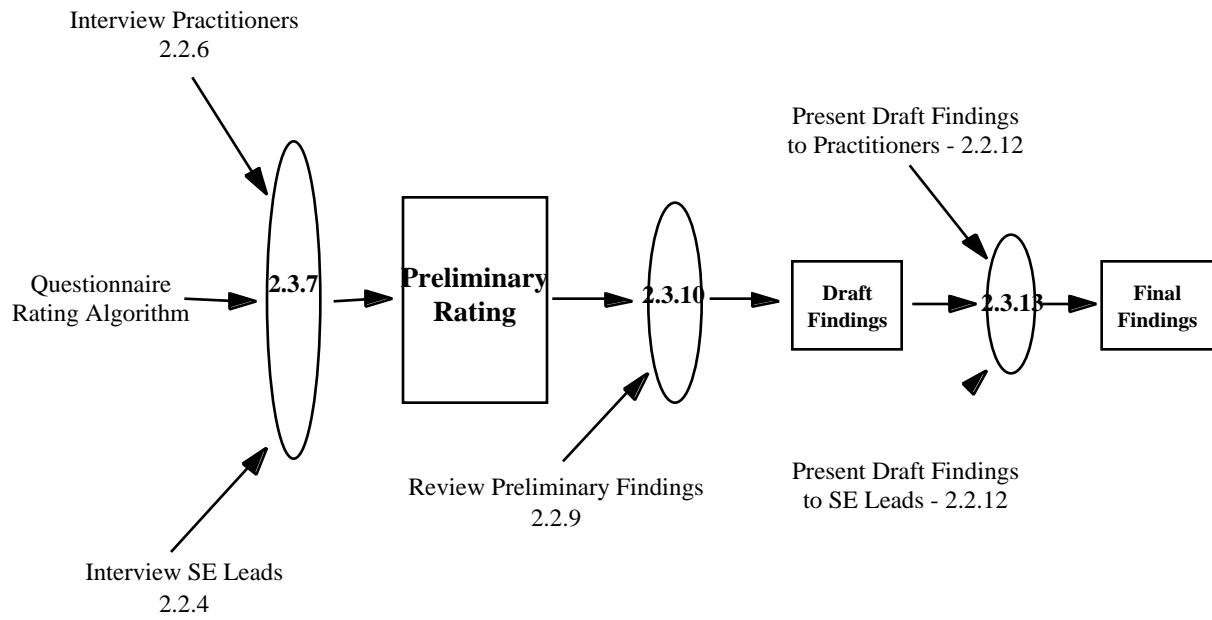


Figure 1-5. Ratings Flow.;Figure 1-5. Ratings Flow.

Ratings Development

As the ratings evolve throughout the appraisal, four separate estimates of the organizational ratings are created. These estimates, and their development throughout the week, are described in the following table. The thrust of this process is to converge on a set of final ratings that fairly represent the team consensus of the organization's capability profile.

Estimate	Role in Appraisal Process
Questionnaire Rating	<p>The questionnaire data from the 3 or 4 projects is entered into the Data Tracking Sheet, from which the initial estimated rating can be calculated.</p> <p>Exploratory questions are developed to resolve discrepancies or inconsistencies in the data from the questionnaires.</p>
Preliminary Rating	<p>The second estimate is achieved upon incorporating answers from exploratory questions and data from the Practitioner interviews.</p> <p>Each incorporated answer is intended to address a discrepancy or inconsistency among the original data in the questionnaire. Consequently, the subsequent columns in the Data Tracking Sheet are annotated to indicate whether the aggregated data indicates compliance or non-compliance with SE-CMM.</p>

Draft Rating	The third estimate is achieved upon incorporating feedback from the SE Leads based on their review of the Preliminary Findings.
Final Rating	The final estimate typically is identical to the draft rating.

Chapter 2: Summaries of SAM Process Elements

Introduction

This chapter contains summaries of the major phases and process elements of the SAM.

In this section

The following process elements are addressed in this chapter:

ID	Process Element Name	See Page
2.1	Preparation	2-3
2.1.1	Obtain Sponsor Commitment	2-6
2.1.2	Select Appraisal Parameters	2-8
2.1.3	Plan Appraisal Details	2-10
2.1.4	Collect Questionnaire Data	2-12
2.2	On Site	2-14
2.2.1	Conduct Opening Meeting	2-20
2.2.2	Familiarize Team with SAM	2-22
2.2.3	Analyze Questionnaire	2-24
2.2.4	Interview Systems Engineering Leads	2-27
2.2.5	Consolidate Data from SE Leads	2-30
2.2.6	Interview Practitioners	2-32
2.2.7	Consolidate Data from Practitioners	2-37
2.2.8	Develop Preliminary Findings	2-40
2.2.9	Review Preliminary Findings	2-42
2.2.10	Develop Draft Rating	2-45
2.2.11	Develop Draft Findings	2-48
2.2.12	Present Draft Findings	2-51
2.2.13	Adjust Draft Findings	2-55
2.2.14	Present Final Briefing	2-58
2.2.15	Brief Sponsor (optional)	2-60
2.2.16	Conduct Wrap-Up	2-62
2.3	Post-Appraisal	2-64
2.3.1	Report Lessons Learned	2-66
2.3.2	Report Appraisal Output to Other Parties	2-67
2.3.3	Manage Records	2-68

Chapter 2: Summaries of SAM Process Elements, Continued

How to read the process element summaries

All process element descriptions are similarly formatted, and contain several blocks, which are described in Table 2-1 below. For each major phase (preparation, on-site, post-appraisal), the summary description contains the process elements that comprise that phase; for the other process elements, the process element summary contains the actual description of that element.

Block Title	Description
Element title/tag	The SAM title for the process element, the code for the process element, and the number of the element used for reference
Purpose	The major purpose for this process element within SAM
Major activities	An overall summary of the activities associated with the process element
Major participants	The major roles involved in the process element and a summary of their responsibilities associated with the process element
Typical duration	A range of the typical time duration (e.g., number of hours) expected for the process element described
Steps	The substeps for the element along with guidance for their performance, if appropriate
Tailorable parameters	The parameters associated with this process element that are expected to be tailored for different appraisal goals
Exit criteria	A description of the decision-making criteria to determine if the process element has been completed
Notes	Notes on the process element that do not fit in any of the other categories

Table 2-1. How to Read Process Element Descriptions.. How to Read Process Element Descriptions.; How to Read Process Element Descriptions. ;{ TC "Table 2-1. How to Read Process Element Descriptions." \ 1 }

2.1 Preparation

**Element title/
tag**

2.1 Preparation (PR)

Purpose

The purpose of the Preparation phase is to prepare the sponsor, the appraisal team, and the appraised entity for the on-site period. Major elements of preparation include

- The sponsor must commit to the resource requirements and action requirements for the appraisal process.
 - The team must be selected to perform the appraisal.
 - The appraised entity must provide preliminary data to the team for analysis.
 - The team must analyze the data prior to arriving on-site.
 - Figure 2-1 shows the major steps in the preparation phase.
-

Diagram

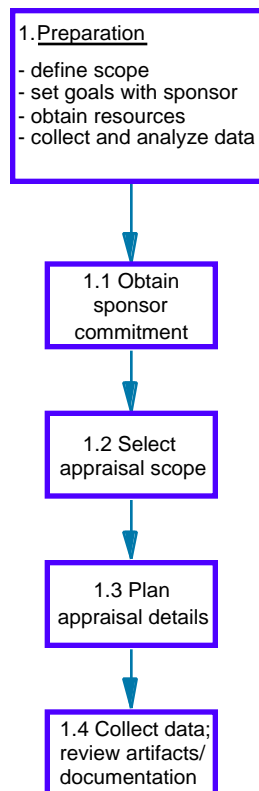


Figure 2-1. Diagram of Preparation Phase.. Diagram of Preparation Phase.;. Diagram of Preparation Phase.;{ TC "Figure 2-1. Diagram of Preparation Phase." \l 1 }

continued on next page

2.1 Preparation, Continued

Summary description

Table 2-2 lists the major activities of the Preparation phase and the expected output of each. Each element is described more fully in the summaries that follow.

ID	Activity	Description	Output
2.1.1	Obtain sponsor commitment	Get the sponsor to <ul style="list-style-type: none"> • agree to the concept of the appraisal • define goals of the appraisal in relation to the sponsor's business goals • agree to provide necessary resources, including funding • understand his/her role in sponsoring the improvement activity implied by engaging in the appraisal 	<ul style="list-style-type: none"> • Appraisal resources • Agreement to proceed and expend resources for the planning and conduct of the appraisal • Appraisal goals related to business goals
2.1.2	Select appraisal parameters	Select appraised entity and appraisal team, and tailor appraisal method as required (e.g., team size, site time, ratings to produce, number of projects, project characteristics)	<ul style="list-style-type: none"> • Preliminary appraisal plan that defines appraisal parameters based on appraisal goals
2.1.3	Plan appraisal details	Use appraisal parameters to develop schedule, training requirements, and appraisal support materials; to select training instruments; to develop and train appraisal team	<ul style="list-style-type: none"> • Approved appraisal plan
2.1.4	Collect data	Administer questionnaire and review any appropriate documents/artifacts	<ul style="list-style-type: none"> • Responses to questionnaire • Document/artifact review notes

Table 2-2. Summary Description of Preparation Phase.. Summary Description of Preparation Phase.; Summary Description of Preparation Phase.:{ TC "Table 2-2. Summary Description of Preparation Phase." \ 1 }

continued on next page

2.1 Preparation, Continued

Major participants

Table 2-3 lists the primary roles involved in the preparation phase and a summary of their activity during this phase.

Role	Summary
Sponsor	Makes the decision to commit to appraisal and provides resource commitments and tailoring guidelines for the appraisal.
Facilitator/site coordinator	Interacts with the management and personnel at the site to obtain commitment for the appraisal and ensure that the planning for the appraisal is successfully completed.
Appraisal team	Interacts with management and the appraisal leader to perform the planning and other preparation activities for the appraisal.

Table 2-3. Participants for Preparation.. Participants for Preparation.; { TC "Table 2-3. Participants for Preparation." \l 1 }

Typical duration

Four to eight weeks, depending on the complexity of the appraisal selected and other site parameters

Tailorable parameters

- Number of site visits prior to on-site period.
- Number of meetings with senior management.
- Number of on-site visits.
- Duration of on-site visit(s).
- Number of meetings with appraisal team.
- Appraisal goals.
- Number of projects to appraise.
- Number of appraisal team members.
- Process area/capability level focus for the appraisal.

Exit criteria

- Appraisal goals established.
- Appraisal resources committed.
- Project, team, participant selection completed.
- Appraisal plan approved.
- Preliminary data gathering completed.

Notes

This is where the overall context for the appraisal is established. The decisions made here will have an impact on the rest of the appraisal activities. All relevant decisions from this phase should be documented in the appraisal plan.

2.1.1 Obtain Sponsor Commitment

**Element title/
tag**

2.1.1 Obtain Sponsor Commitment (OC).

Purpose

The purposes of Obtain Sponsor Commitment are to establish the sponsor's commitment to the appraisal and to determine the major goals of the appraisal, which will guide the selection of appraisal parameters.

**Summary
description**

Obtain Sponsor Commitment involves meeting with the sponsors of the appraisal to provide an understanding of the concepts of the SE-CMM and the SE-CMM appraisal method (SAM), engaging the sponsor in dialogue to determine his/her goals for the appraisal, and negotiating a commitment for resources, including personnel and funding for the appraisal activities. A primary aspect of obtaining sponsor commitment is ensuring that the sponsor understands his/her role in the appraisal. For tailoring guidance, please read the related chapter 3 paragraphs.

**Major
participants**

Table 2-4 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Sponsor	Engages in dialogue with appraisal leader/champion to understand appraisal context and set appraisal goals; commits resources for the appraisal.
Appraisal champion	Establishes link between sponsor, appraisal team leader, and potential appraisal participants.
Appraisal team leader	Provides sponsor with information needed to make a commitment decision on the appraisal; provides a link between the appraisal champion and potential appraisal participants.

Table 2-4. Participants for Obtain Sponsor Commitment..
Participants for Obtain Sponsor Commitment.; **Participants for**
Obtain Sponsor Commitment.;{ TC "Table 2-4. Participants for
Obtain Sponsor Commitment." \ 1 }

continued on next page

2.1.1 Obtain Sponsor Commitment, Continued

Typical duration	Two hours to several weeks
Tailorable parameters	<ul style="list-style-type: none">• Method of interaction with sponsor: all face-to-face meetings, combination of telephone/video and face to face meetings, combination of written communication and face-to-face meetings, etc.• Number of interactions with sponsor.
Exit criteria	<ul style="list-style-type: none">• Appraisal goals established.• Sponsor commitment to provide appraisal resources obtained.• Sponsor commitment to appropriate behavior during the appraisal obtained.
Notes	<p>This is a go/no-go decision point. If sponsor commitment for the appraisal is not obtained, no further process elements related to SAM will be performed.</p> <p>Guidance on using business goals and organization context for tailoring the appraisal is addressed in Chapter 3.</p>

2.1.2 Select Appraisal Parameters

Element title/tag 2.1.2 Select Appraisal Parameters (SP).

Purpose The purpose of Select Appraisal Parameters is to determine how the SAM needs to be tailored in order to meet the goals established for the appraisal with the sponsor.

Summary description Select Appraisal Parameters involves determining the membership of the appraisal team, the profile of projects to be selected from the appraised entity, and the major appraisal participants. In addition, a preliminary appraisal plan is produced that documents the tailoring of SAM process elements. For tailoring guidance, please read the related Chapter 3 paragraphs.

Major participants Table 2-5 lists the primary roles involved in this process element and the summary of their activity during this process.

Role	Summary
Appraisal team leader (ATL) or facilitator	Engages in dialogue with the appraised entity's management to determine the project profile for the appraisal; engages with the appraising organization to determine the makeup of the appraisal team (in the case of self-improvement, this is the same as the appraised entity). Produces plan.
Sponsor	Engages in dialogue with ATL and provides appropriate input on team and appraised entity characteristics.

Table 2-5. Participants for Select Appraisal Parameters..
Participants for Select Appraisal Parameters.;
Participants for Select Appraisal Parameters.;
 { TC "Table 2-5. Participants for Select Appraisal Parameters." \l 1 }

Typical duration One to two weeks, depending on complexity of tailoring required

Tailorable parameters

- Depth of documentation of tailoring decisions.

continued on next page

2.1.2 Select Appraisal Parameters, Continued

Exit criteria

- Appraisal team leader selected.
- Appraisal team selected.
- Projects to be appraised selected.
- Appraisal participants selected.
- Preliminary appraisal plan developed.

Notes

This is the step where tailoring decisions are made and documented based on the goals of the appraisal.

Guidance on tailoring the appraisal to support the organization's business goals and organizational context is addressed in Chapter 3.

2.1.3 Plan Appraisal Details

Element title/tag 2.1.3 Plan Appraisal Details (PD).

Purpose The purpose of Plan Appraisal Details is to produce and obtain approval for the final appraisal plan, which documents the parameters and details of the appraisal. For tailoring guidance, please read the related Chapter 3 paragraphs.

Summary description Plan Appraisal Details involves establishing the availability of planned interviewees during the on-site period, planning the logistics of the appraisal (meeting rooms, support staff availability, etc.), and verifying the schedule for the appraisal with all affected parties. It also involves verifying who will receive data on the conclusions of the appraisal and establishing feedback mechanisms for lessons learned. For tailoring guidance, please read the related Chapter 3 paragraphs.

Major participants Table 2-6 lists the primary roles involved in this process element and the summary of their activity during this process.

Role	Summary
Appraisal team leader	Oversees production of and approval for final appraisal plan.
Appraisal team	Produces assigned sections of appraisal plan.
Sponsor	Approves final appraisal plan.
Appraisal champion	Stays in touch with site coordinator on progress of preparation and assists in removing obstacles for the appraisal.
Site coordinator	Verifies the schedules of the intended participants, arranges logistics details for the appraisal.

Table 2-6. Participants for Plan Appraisal Details.. Participants for Plan Appraisal Details.; Participants for Plan Appraisal Details.:{ TC "Table 2-6. Participants for Plan Appraisal Details." \ 1 }

Typical duration Two to six weeks, depending on the complexity of the appraisal plan

Tailorable parameters

- Degree to which details are planned (depends on the complexity of the appraisal).

continued on next page

2.1.3 Plan Appraisal Details, Continued

Exit criteria

- Appraisal schedule established.
- Appraisal participant availability confirmed.
- Appraisal plan approved.
- Logistics of appraisal prepared.

Notes

This is when the actual schedule for the on-site phase is produced. (See Appendix F, Site Coordinator Checklist, for details on preparing for the logistics of an appraisal.)

If the appraisal champion has not become an appraisal team member, he/she is likely to keep in touch with the appraisal team leader throughout the appraisal preparation phase.

Any useful documents, such as policies, process descriptions (often in training materials), standards, even meeting minutes or action item lists, may be requested, collected, and stored for use by the appraisal team.

2.1.4 Collect Questionnaire Data

Element title/tag 2.1.4 Collect Questionnaire Data (CQ).

Purpose The purpose of Collect Questionnaire Data is to obtain profile information on the appraised entity and to administer and collect data from the questionnaire. Preliminary transference of the questionnaire to the DTS can also be performed as part of this step if the necessary resources are available.

Summary description Collect Questionnaire Data involves administering and collecting results from the questionnaire and instruments used to profile the organization. The questionnaire rephrases the base and generic practices of the SE-CMM into a form that is appropriate for data gathering. Its results are used to focus the on-site data gathering for the appraisal. The questionnaire responses are transferred to the data tracking sheet either in this step or in the "Analyze Questionnaire" step in Chapter 2. For tailoring guidance, please read the related Chapter 3 paragraphs.

Major participants Table 2-7 lists the primary roles involved in this process element and the summary of their activity during this process.

Role	Summary
Appraisal participants	The selected participants provide data on projects and the organization via profile questions and the questionnaire. The questionnaire may be administered in various ways, e.g., all participants together in a face-to-face meeting, as an on-line response activity, or mail-ins. It is recommended that the questionnaire be administered to the group, with the facilitator or other person with knowledge about the SE-CMM present to answer questions of terminology, etc.
Site Coordinator	Determines respondents of the questionnaires and may oversee administration .
Appraisal team leader of facilitator	Conducts any meetings related to introducing the data collection activity.
Sponsor	Ensures that all participants are made available for data collection.

Table 2-7. Participants for Collect Questionnaire Data..
Participants for Collect Questionnaire Data.; **Participants for**
Collect Questionnaire Data.;{ TC "Table 2-7. Participants for
 Collect Questionnaire Data." \ 1 }

continued on next page

2.1.4 Collect Questionnaire Data, Continued

Typical duration	One to two hours per participant
Tailorable parameters	<ul style="list-style-type: none">• Method of administering questionnaires.• Contents of questionnaire, based on appraisal goals (e.g., if only appraising process areas 1, 3, 7, only use those questionnaire items).• Amount of analysis performed prior to on-site phase.• Transference of questionnaire responses to the DTS.
Exit criteria	<ul style="list-style-type: none">• Project profile information received by appraisal team.• Filled-in questionnaires received by appraisal team.• Optional: if it is decided to transfer questionnaire responses prior to the on-site phase, the transference should be completed at the end of this process element.
Notes	See the questionnaire distribution table in Section 3.3 and the SAM questionnaire instructions in Appendix F and J for information on using the questionnaire to collect data. See Section 2.2.3 for details on transferring the questionnaire responses to the DTS.

2.2 On Site

Element title/tag 2.2 On Site

Purpose

The purpose of the On-Site phase is to explore the results of the preliminary data analysis, provide an opportunity for practitioners at the appraised entity to participate in the data gathering and validation process, and provide practitioners and management with input on the results of the appraisal. Figure 2-2 shows the steps in the On-Site phase.

It should be noted that the On-Site phase may occur over several visits. Appendix D demonstrates the various on-site schedules that may be followed.

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2.2 On Site, Continued

Diagram

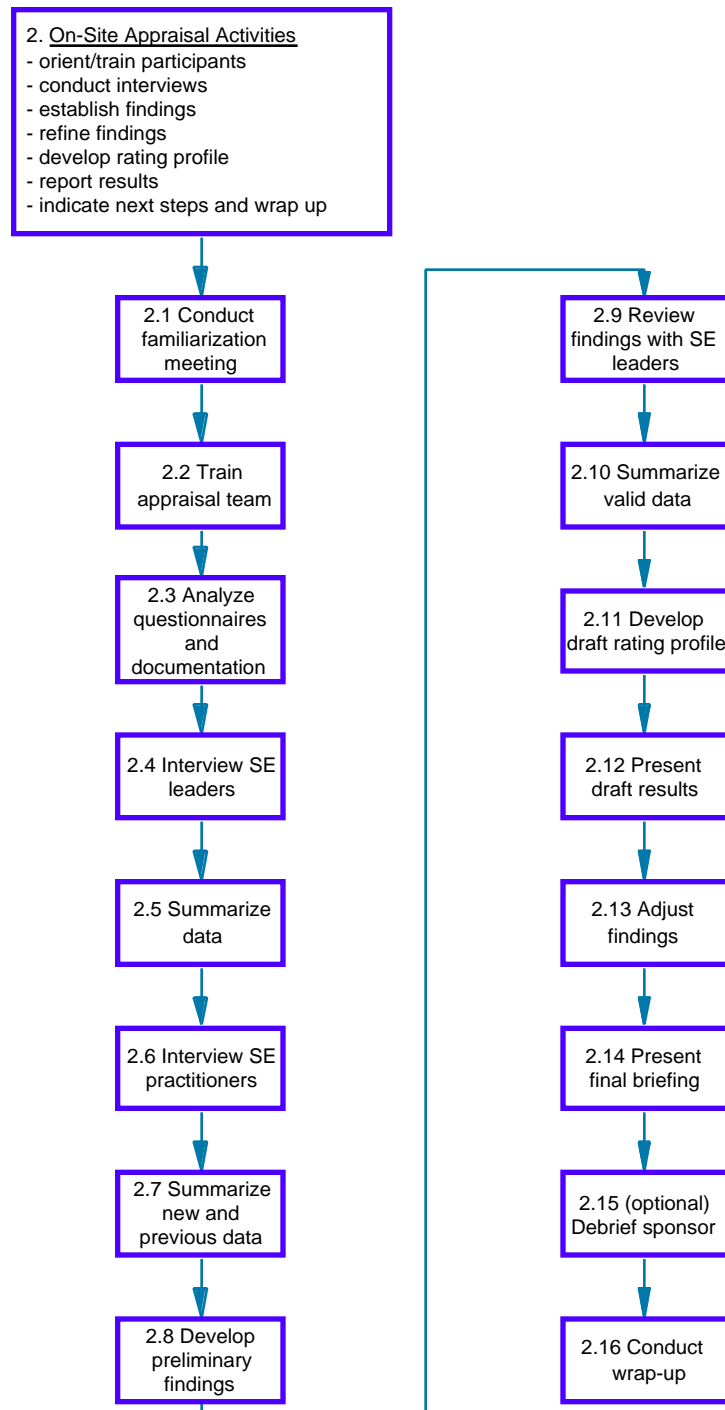


Figure 2-2. Diagram of On-Site Phase.. Diagram of On-Site Phase.;{ TC "Figure 2-2. Diagram of On-Site Phase." \l 1 }

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2.2 On Site, Continued

Summary description

Table 2-8 lists the major activities of the on-site phase and the expected output of each. Each element is described more fully in the summaries that follow.

ID	Activity	Description	Outputs
2.2.1	Conduct opening meeting	The opening meeting provides participants with an overview of the appraisal and reminds them of the context of the appraisal (e.g., schedule and confidentiality). It is also the time where the sponsor expresses support of the appraisal and subsequent process improvement activities.	<ul style="list-style-type: none"> Supported appraisal effort Answered questions
2.2.2	Familiarize team with SAM	The facilitator instructs the appraisal team on the detailed conduct of the appraisal activities and introduces the use of the model for appraisal.	<ul style="list-style-type: none"> Prepared team
2.2.3	Analyze questionnaire	The appraisal team analyzes the responses to the questionnaire and formulates a set of follow-on, exploratory questions for the systems engineering leads.	<ul style="list-style-type: none"> Exploratory questions
2.2.4	Interview systems engineering leads	Through structured interview techniques using the exploratory questions, the appraisal team gathers corroborating data regarding the project's systems engineering practices.	<ul style="list-style-type: none"> Interview notes Data requests
2.2.5	Consolidate data from SE leads' interviews	The team members review their notes, discuss any issues, and update their data tracking sheets (DTSs).	<ul style="list-style-type: none"> Updated DTS Adjustments to practitioner interviews

Table 2-8. Summary Description of the On-Site Phase.. Summary Description of the On-Site Phase.;. Summary Description of the On-Site Phase.;{ TC "Table 2-8. Summary Description of the On-Site Phase." \l 1 }

continued on next page

2.2 On Site, Continued

Summary description, continued

ID	Activity	Description	Outputs
2.2.6	Interview practitioners	Through open-ended, facilitated discussion, the team gathers corroborating data on organizational practices from different types of practitioners.	<ul style="list-style-type: none"> • Interview notes
2.2.7	Consolidate data from practitioner interviews	The team members review their notes, discuss any issues, and update their data tracking sheets.	<ul style="list-style-type: none"> • Updated DTS
2.2.8	Develop preliminary findings	Using all data sources available, the team generates a preliminary list of findings with regard to the organization's systems engineering practices.	<ul style="list-style-type: none"> • Preliminary findings
2.2.9	Review preliminary findings	The team provides preliminary findings to systems engineering leads to validate that what they heard is correct.	<ul style="list-style-type: none"> • Notes from presentations • Validated/corrected findings
2.2.10	Develop draft rating	The team members review their notes, discuss any issues, update their data tracking sheets, and formulate draft ratings.	<ul style="list-style-type: none"> • Updated DTS • Draft ratings
2.2.11	Develop draft findings	The team prioritizes and provides wording for findings that fit the appraisal context.	<ul style="list-style-type: none"> • Prioritized draft findings

Table 2-8. Summary Description of the On-Site Phase, continued

continued on next page

2.2 On Site, Continued

Summary description, continued

ID	Activity	Description	Outputs
2.2.12	Present draft findings	The team reports appraisal findings to the appraisal practitioners and systems engineering leads.	<ul style="list-style-type: none"> • Practitioner feedback • Feedback from systems engineering leads • Proposed adjustments to findings
2.2.13	Adjust draft findings	Based on participants' feedback, the findings are adjusted for final presentation. At this time, the process area (PA) ratings are reviewed for appraisal team consensus.	<ul style="list-style-type: none"> • Final briefing • Findings • PA ratings
2.2.14	Present final briefing	The final findings and process capability profile are presented to all participants in the presence of the sponsor. Future activities are discussed.	<ul style="list-style-type: none"> • Participant buy-in • Participant expectations
2.2.15	Brief sponsor (optional)	The team provides the sponsor with the opportunity to discuss the results with the appraisal team privately.	<ul style="list-style-type: none"> • Sponsor buy-in • Sponsor expectations
2.2.16	Conduct wrap-up	The appraisal team discusses post on-site activities. They also provide feedback regarding the SE-CMM and SE-CMM appraisal method for use by the SE-CMM collaboration.	<ul style="list-style-type: none"> • Follow-on plans • SE-CMM feedback

Table 2-8. Summary Description of the On-Site Phase, continued

continued on next page

2.2 On Site, Continued

Typical duration See Appendix D, Sample Schedules for the On-Site

Tailorable parameters

- Number of interviews.
- Number of visits.
- Number and type of document reviews.
- Amount of direction in interviews.

Exit criteria

- Interviews completed.
- Document reviews completed.
- Findings briefing delivered.
- Appraisal report planned.
- Feedback on SE-CMM and SAM collected.

2.2.1 Conduct Opening Meeting

Element title/tag 2.2.1 Conduct Opening Meeting (OM)

Purpose The purpose of Conduct Opening Meeting is to present the appraisal process and schedule to the sponsor and all appraisal participants. An additional purpose is for the sponsor to express support for the appraisal activities.

Summary description Conduct Opening Meeting involves gathering all the appraisal participants together, along with the sponsor or customer of the appraisal (depending on appraisal context), to review the appraisal process and reaffirm the sponsor's commitment to the appraisal.

Major participants Table 2-9 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Appraisal team leader	Welcomes participants and introduces sponsor.
Sponsor	Shows management support for the appraisal and subsequent process improvement activities.
Facilitator	Presents brief overview of the model and appraisal.
Site coordinator	Presents schedules and locations.
Appraisal team	Supports appraisal team leader.
Appraisal participants	Learn their role in the on-site phase of appraisal activities.

Table 2-9. Participants for Conduct Opening Meeting.. Participants for Conduct Opening Meeting.;. Participants for Conduct Opening Meeting.;{ TC "Table 2-9. Participants for Conduct Opening Meeting." \l 1 }

Typical duration 1.5 hours

continued on next page

2.2.1 Conduct Opening Meeting, Continued

Steps

Table 2-10 shows the steps for this process element.

Step	Guidance
Sponsor comments	The sponsor expresses support for the appraisal and commitment to the resulting process improvement recommendations.
SE-CMM introduction	The facilitator gives a brief introduction to the SE-CMM.
Appraisal process	The facilitator presents an overview of the appraisal process. Confidentiality rules are explained.
Schedule review	The site coordinator reviews the schedule and locations for the week's activities and stresses the necessity of being on time.
Question & answer	The sponsor, facilitator, and appraisal team leader answer any questions from the appraisal participants.

Table 2-10. Steps for Conduct Opening Meeting.. Steps for Conduct Opening Meeting.;; Steps for Conduct Opening Meeting.;;{ TC "Table 2-10. Steps for Conduct Opening Meeting." \ 1 }

Tailorable parameters

- The presentation will vary based on the purpose of the appraisal. In any case, the way in which the results will be used should be a part of this presentation.

Exit criteria

- Opening briefing delivered.
- Questions of appraisal participants answered.

Notes

Refer to Appendix A for a sample opening briefing.

The appraisal goals and use of results is established in the preparation phase as part of Select Appraisal Parameters.

2.2.2 Familiarize Team with SAM

Element title/tag 2.2.2 Familiarize Team with SAM (FT)

Purposes The purpose of Familiarize Team with SAM is to prepare the appraisal team for performing its role in the appraisal process.

Summary description This is an opportunity for the appraisal team to begin to work together. The briefing begins with a review of the SE-CMM. The appraisal steps are presented in greater detail than at the opening meeting, and the team's role in each step is clarified.

Major participants Table 2-11 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Facilitator	Presents the familiarization briefing and answers any questions.
Appraisal team	Brings up any questions on the model and appraisal method.

Table 2-11. Participants for Familiarize Team with SAM.. Participants for Familiarize Team with SAM.;. Participants for Familiarize Team with SAM.;{ TC "Table 2-11. Participants for Familiarize Team with SAM." \ 1 }

Typical duration Two to three hours

continued on next page

2.2.2 Familiarize Team with SAM, Continued

Steps

Table 2-12 shows the steps for this process element.

Step	Guidance
Team building	The facilitator leads the team in a team-building exercise; at the very least, all team members introduce themselves.
Review SE-CMM	The facilitator presents the salient features of the model and its use in appraisal and discusses them with the team.
Review SAM	The facilitator explains each step in the appraisal process. The team's role is described with particular emphasis on behavior and note-taking procedures to be followed during interviews. The facilitator presents the techniques that will be followed to manage data, develop results, and reach consensus.
Question and answer	The facilitator responds to the team's questions concerning the model and the appraisal process.

Table 2-12. Steps for Familiarize Team with SAM.. Steps for Familiarize Team with SAM.; Steps for Familiarize Team with SAM.;

{ TC "Table 2-12. Steps for Familiarize Team with SAM." \ 1 }

Tailorable parameters

- Depth of instruction on model and SAM, depending on experience of team.
- Types of tools to use to support the appraisal.

Exit criteria

- Appraisal team understands use of SE-CMM in appraisal.
- Appraisal team understands its role in appraisal activities.
- Appraisal team commits to performing the appraisal as structured in preparation phase.

Notes

Because there is no formal training available for v1.0 of SAM, this step is important to ensure that the appraisal team understands the basic flow of the appraisal activities and their responsibilities throughout the week. See Appendix E for some support materials useful in familiarizing the appraisal team with SAM. Other appendices contain support materials (e.g., data tracking sheet) that the team may wish to use.

2.2.3 Analyze Questionnaire

Element title/tag 2.2.3 Analyze Questionnaire (AQ)

Purpose The purpose of Analyze Questionnaire is to develop a set of exploratory questions for use in the interviews with the systems engineering leads.

Summary description The appraisal team analyzes the responses to the questionnaire to determine areas for practice validation and potential discrepancy, and to perform a gap analysis against the SE-CMM. If not completed previously, the questionnaire responses are transcribed to the data tracking sheets. This process element results in a set of candidate exploratory questions (EQ) for the interview with the systems engineering leads, and "listen fors" at practitioner sessions. Training materials, or project-specific data such as plans, meeting agendas, or action item lists, that have been collected may be reviewed and used to support EQ development or corroborate questionnaire answers.

Major participants Table 2-13 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Facilitator	Provides guidance in the formulation of exploratory questions and, if necessary, transcription of the questionnaire responses to the DTS.
Appraisal team	Develops and agrees upon set of follow-up questions for each of the SE leaders, and "listen fors" during practitioner sessions.

Table 2-13. Participants for Analyze Questionnaire.. Participants for Analyze Questionnaire.;. Participants for Analyze Questionnaire.;{ TC "Table 2-13. Participants for Analyze Questionnaire." \ 1 }

Typical duration Four hours

continued on next page

2.2.3 Analyze Questionnaire, Continued

Steps

Table 2-14 shows the steps for this process element.

Step	Guidance
Review responses	The appraisal team reviews the questionnaires and the data tracking sheets.
Transcribe to DTS (if necessary)	The appraisal team, with guidance from the facilitator, transcribes the questionnaire responses from the original questionnaires to the DTS. This is most easily accomplished with 2-person teams, with one calling out question number and response, and the other recording in the appropriate spot in the DTS. With a 6-person appraisal team (three 2-person teams), all 17 process areas can be fairly easily transcribed in an hour (assuming 3-4 respondents per questionnaire). The handwritten DTSs can then be transcribed by support staff for future electronic processing.
Generate questions	<p>The appraisal team, with guidance from the facilitator, generates 20-40 exploratory questions for each systems engineering lead. The questions should be designed to elicit more than just a yes/no response. For example, questions often begin with, "Would you please describe . . ." When looking for certain responses, e.g., "SE management plan," note these words as "listen fors" that the facilitator can use as a cue to ask additional questions if they are not mentioned. Some questions may be accompanied by a request for relevant or supporting documents.</p> <p>Questions should be used to refine answers or explore inconsistencies. There is a separate set of questions for each systems engineering lead. However, there is usually some overlap. Once the questions are developed they should be transcribed into an appropriate form, and copies should be made for each team member. The form should list each question, any "listen fors," document requests, and room for notes.</p>

Table 2-14. Steps for Analyze Questionnaire.. Steps for Analyze Questionnaire.; Steps for Analyze Questionnaire. ;{ TC "Table 2-14. Steps for Analyze Questionnaire." \l 1 }

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2.2.3 Analyze Questionnaire, Continued

Steps, continued

Step	Guidance
Generate questions, continued	<p>If the exploratory question generation process is not well managed, it can easily exceed the typical four hour duration. A method for quickly generating a pool of questions follows:</p> <ul style="list-style-type: none"> • Facilitator leads exploratory question generation example with one process area to get team oriented to using the data embedded in the questionnaire. • Process areas are split up between the appraisal team members according to their specialty areas and to provide balance in workload. • For each process area, the team member uses the initial DTS to scan for inconsistencies between the projects and within a project. • Where probe points are discovered, the team member formulates a candidate question on a post-it note, marked with team member's initials, the SE lead (or leads) for whom question is intended, and the PA item reference that led to the question. • The post-its can be laid out in a matrix with PAs across the top and SE leads down the side to get a picture of the sampling space represented by the initial question pool. • The team reconvenes and comes to consensus on which items to ask each SE lead.

Table 2-14. Steps for Analyze Questionnaire, continued

Tailorable parameters

- When analysis is performed (may be done before on-site week).

Exit criteria

- Exploratory questions and data requests are prepared for each systems engineering lead.

Notes

The facilitator can prepare for this step before the on-site period. A team may request and use documentation generated for or by a process area to help demonstrate a capability level, in addition to the interview data.

2.2.4 Interview Systems Engineering Leads

Element title/tag 2.2.4 Interview Systems Engineering Leads (IL)

Purpose The purpose of Interview Systems Engineering Leads is to resolve any misunderstandings about the responses to the questionnaire, and to explore areas that the appraisal team wishes to have clarified.

Summary description The session facilitator introduces the team, explains the purpose of the session, and asks the systems engineering lead the exploratory questions. A session recorder tracks the responses and, along with the rest of the appraisal team, takes notes. As a result of some responses, the systems engineering lead may be asked to supply certain documents for later review. There is a separate session for each systems engineering lead.

Major participants Table 2-15 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Session facilitator	Conducts session and asks exploratory questions. The session facilitator need not be the appraisal facilitator. If team members possess the skills and experience to conduct structured interviews, they should be encouraged to conduct at least some of the interviews with the systems engineering leads.
Session recorder	Records responses, monitors the time, and makes a list of any requested documentation.
Appraisal team	Takes notes of responses and occasionally asks for additional clarification.
Systems engineering lead	Responds to questions.

Table 2-15. Participants for Interview Systems Engineering Leads.. Participants for Interview Systems Engineering Leads.;
Participants for Interview Systems Engineering Leads.;{ TC "Table 2-15. Participants for Interview Systems Engineering Leads." \ 1 }

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2.2.4 Interview Systems Engineering Leads, Continued

Typical duration One hour per session + 15 minutes for team discussion and a 15 minute break.

Steps Table 2-16 shows the steps for this process element.

Step	Guidance
Introduction	The session facilitator welcomes the systems engineering lead and introduces the appraisal team. The facilitator then explains the purpose of the session and how it will be conducted. He/she also reminds the systems engineering lead about the confidentiality rules and encourages frank responses to the questions.
Exploratory questions	The session facilitator asks each exploratory question while the session recorder keeps track of the time and any requests for documents. All other team members take notes. Any team member can ask a question, though the session facilitator should be allowed to lead the questioning to ensure that all high-priority questions are covered. The session facilitator should follow-up on the "listen fors" and make any document requests.
Closing	At the end of the questions (or when time has expired), the session facilitator concludes the session by reminding the systems engineering lead of the time and location of their next meeting for reviewing the preliminary findings. The session recorder reminds the systems engineering lead of any document requests and arranges for collecting them. The session facilitator thanks the systems engineering lead for his/her cooperation.

Table 2-16. Steps for Interview Systems Engineering Leads.. Steps for Interview Systems Engineering Leads.;. Steps for Interview Systems Engineering Leads.;{ TC "Table 2-16. Steps for Interview Systems Engineering Leads." \l 1 }

Tailorable parameters

- Who is assigned as the session facilitator.
- Depth of follow-up on individual issues.

Exit criteria

- As many exploratory questions as possible are covered.

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2.2.4 Interview Systems Engineering Leads, Continued

Notes

The reason exploratory questions are ordered by priority is to make sure that the most important questions (to the team) are asked. It is uncommon for all the scripted questions to be addressed. A team may request and use documentation generated for or by a process area to demonstrate a capability level.

Depending on the acceptability in the appraisal organization's culture, it is very useful to have the session recorder use a laptop or other workstation to key in responses and dialogue from EQs as they are happening. If the EQs have been prepared online, and responses are recorded in spaces between, this permits much more rapid consolidation of post-interviews. More than one or two laptops being used seems daunting to most interviewees, however, and manual note taking is recommended for most team members. Ask before using a laptop or other recording instrument.

2.2.5 Consolidate Data from SE Leads

Element title/tag 2.2.5 Consolidate Data from SE Leads (CD1)

Purpose The purpose of Consolidate Data from SE Leads is to assimilate the notes taken during the interviews with the systems engineering leads.

Summary description Consolidate Data from SE Leads involves updating the DTS to reflect the information gained in the interviews with the systems engineering leads. It also allows the members of the appraisal team to verify their understanding of the information obtained in the interviews with the other team members. Finally, this data consolidation step allows the team to strategize any needed changes in the scheduling or other aspects of the remaining data gathering.

Major participants Table 2-17 lists the primary roles involved in this process element and the summary of their activity during this process.

Role	Summary
Facilitator	Provides guidance and model expertise for the team's deliberations.
Appraisal team	Reviews their notes, discusses any issues, formulates observations, and updates their data tracking sheets

Table 2-17. Participants for Consolidate Data from SE Leads..
Participants for Consolidate Data from SE Leads.; Participants for Consolidate Data from SE Leads. ;{ TC "Table 2-17. Participants for Consolidate Data from SE Leads." \l 1 }

Typical duration One hour

continued on next page

2.2.5 Consolidate Data from SE Leads, Continued

Steps

Table 2-18 shows the steps for this process element.

Step	Guidance
Review notes	Each team member privately reviews his/her notes from the interviews with the systems engineering leads.
Update DTS	Each team member updates the data tracking sheets by adding a plus (+) or minus (-) to those base/generic practices for which corroborating or opposing evidence was heard.
Discuss issues	Team members raise issues that they have encountered during the review and update steps. The facilitator moderates the discussions to give each issue a chance to be aired. At the end of the discussion, team members may wish to alter their entries to their data tracking sheets.
Preparation	The team discusses the upcoming events and any alterations that they may wish to make based on the previous discussions. In particular, the team may want the session facilitators to guide the discussions into certain areas during one or more of the practitioner interviews. This direction should be carefully limited, as too much direction of the practitioner discussions will stifle spontaneity.

Table 2-18. Steps for Consolidate Data from SE Leads.. Steps for Consolidate Data from SE Leads.;. Steps for Consolidate Data from SE Leads.;{ TC "Table 2-18. Steps for Consolidate Data from SE Leads." \1 }

Tailorable parameters

- None

Exit criteria

- Team members complete update of their DTS.
- Changes to schedule and other data gathering mechanisms are agreed to.

Notes

See Appendix C for details on the format and suggested use of the data tracking sheets.

2.2.6 Interview Practitioners

Element title/tag 2.2.6 Interview Practitioners (IP)

Purpose The purpose of Interview Practitioners is to meet with the actual systems engineers and practitioners of related support processes (e.g., quality assurance, manufacturing) to obtain corroboration of the key issues previously asserted and to identify new issues.

Summary description Interview Practitioners involves facilitating a relatively free-form discussion centered around the question, "What works or doesn't work well in the systems engineering process?" This discussion typically provides corroborating and clarifying data in relation to other sources.

In some cases, the facilitator may provide minimal direction into topic areas needed to be "filled in," based on the DTS. It is usually best to let the free-form part of the discussion begin the session; otherwise, participants may get the impression of a question and answer format, and cease volunteering the issues that are important to them.

Major participants Table 2-19 lists the primary roles involved in this process element and the summary of their activity during this process.

Role	Summary
Session facilitator	Keeps discussion moving without influencing its direction.
Appraisal team	Takes notes of discussions.
Practitioners	Present issues from their perspective.

Table 2-19. Participants for Interview Practitioners.. Participants for Interview Practitioners.;. Participants for Interview Practitioners.;{ TC "Table 2-19. Participants for Interview Practitioners." \l 1 }

Typical duration Two hours per practitioner group

continued on next page

2.2.6 Interview Practitioners, Continued

Steps

Table 2-20 shows the steps for this process element.

Step	Guidance
Preparation	<p>Arrange the interview area before the practitioners' arrival. The setup can be around a table or in a circle without a table. In either case, the team should occupy every other seat, forcing the practitioners to spread out around the circle. The team members should be in their seats before the practitioners arrive. It is important to begin the meeting on time. If possible, have someone not on the team call any latecomers or no-shows.</p>
Introduction	<p>The session facilitator</p> <ul style="list-style-type: none"> • Welcomes the practitioners and introduces the session's topic (if appropriate). • Explains the purpose of the session and how it will be conducted, i.e., an unstructured discussion of the systems engineering process from the viewpoint of the practitioners. • Lets the practitioners know that the team will listen and take notes but that the direction of the discussions will be up to them. • Warns them that, at the end of the session, each participant will be asked for a strength and a weakness of the appraised entity. <p>The session facilitator reminds the practitioners about the confidentiality rules, encourages frank discussions, and cautions the participants about repeating comments outside of the interview. The team and practitioners then introduce themselves, giving their name and role (team members should identify themselves as "members of the appraisal team"). The facilitator then turns the meeting over to the practitioners.</p>

Table 2-20. Steps for Interview Practitioners.. Steps for Interview Practitioners.;. Steps for Interview Practitioners.;{ TC "Table 2-20. Steps for Interview Practitioners." \l 1 }

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2.2.6 Interview Practitioners, Continued

Steps, continued

Step	Guidance
Discussion	<p>The session facilitator keeps the conversation moving with as little intrusion as possible. Team members should not participate in the conversations. The session facilitator should note non-participating practitioners and try to bring them into the conversation in a non-directed manner (e.g., "What do you think about that, Tom?").</p> <p>If the discussions lag, or special topics have been identified, the session facilitator should gently "nudge" the discussion in the desired direction. If this is not done carefully, the participants will continually look to the facilitator for direction and the interview will lose its spontaneity. The facilitator should use leading comments (e.g., "How about quality assurance . . .?"), and avoid direct yes/no questions (e.g., "Do you do quality assurance?"), or judgmental questions (e.g., "Why don't you do quality assurance?").</p>

Table 2-20. Steps for Interview Practitioners, continued. Steps for Interview Practitioners, continued;. Steps for Interview Practitioners, continued;{ TC "Table 2-20. Steps for Interview Practitioners, continued" \l 1 }

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2.2.6 Interview Practitioners, Continued

Steps, continued

Step	Guidance
Closing	<p>Near the end of the session, the facilitator brings the conversation to an end and asks two questions of each practitioner. If the facilitator senses that the discussions have reached the end of their usefulness, he/she can end the session before the end of the full time period.</p> <p>The session facilitator then asks each practitioner the following question:</p> <p><i>If you could change one thing in your organization other than your boss or your paycheck, what would it be?</i></p> <p>Next, the facilitator asks each practitioner (perhaps going around the group in the opposite direction):</p> <p><i>Other than the people, what do you think is this organization's major strength?</i></p> <p>Note the word "organization" should be customized for the situation.</p> <p>Finally, the session facilitator thanks the practitioners for their participation and reminds them of the time and location for presenting the draft findings.</p>
Process check	<p>In the interval between practitioner interviews, the team should perform a brief process check of how the last interview went, and discuss any changes or special situations anticipated with the next group. The sessions are long, so be sure to leave time for breaks before the next group arrives.</p>

Table 2-20. Steps for Interview Practitioners, continued. Steps for Interview Practitioners, continued;. Steps for Interview Practitioners, continued;{ TC "Table 2-20. Steps for Interview Practitioners, continued" \1 1 }

Tailorable parameters

- Number and makeup of practitioner groups.
- Use of middle manager or other focus groups, perhaps outside of on-site week.

Exit criteria

- Session completed.

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2.2.6 Interview Practitioners, Continued

Notes

Practitioner groups may be grouped according to life-cycle phase (requirements engineers/architects in one group, integrators/testers in another), organizational boundaries (all the CM and training folks together since they are outside the systems engineering organization hierarchy), or other ways that will maximize the information obtained. A project management practitioner group might be set up if the systems engineering and project management functions (as defined in the project section of the SE-CMM) are across organizational boundaries. The point is to use the particular organizational context to best advantage to corroborate data obtained via the questionnaire and interviews with the systems engineering leads. A team may request and use documentation generated for or by a process area to demonstrate a capability level.

Middle manager buy-in may be obtained by having a practitioner or focus group before the on-site week, which provides an opportunity to engage them as "owners" of the action plan recommendations after the on-site period. In addition, in some organizations, marketing or business development will "own" product line evolution, and should be included in practitioner groups or have a mini-focus group.

A session recorder may use a laptop or other workstation if the organization's culture permits it. This greatly facilitates consolidation of data and application of key phrases to findings. Ask before using a laptop or other recording equipment. In no case should more than one or two use laptops.

2.2.7 Consolidate Data from Practitioners

Element title/tag 2.2.7 Consolidate Data from Practitioners (CD2)

Purpose The purpose of Consolidate Data from Practitioners is to assimilate the notes taken during the practitioner interviews and form preliminary ratings for each process area.

Summary description Consolidate Data from Practitioners involves updating the DTS to reflect the information gained in the interviews with the systems engineering leads. It also allows the members of the appraisal team to verify their understanding of the information obtained in the interviews with the other team members. Finally, this data consolidation step allows the team to strategize any needed changes in the scheduling or other aspects of the remaining data gathering. In addition, Consolidate Data from Practitioners is the first time when the team attempts to develop a rating profile.

Major participants Table 2-21 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Facilitator	Provides guidance and model expertise for the team's deliberations.
Appraisal team	Review their notes, discuss any issues, formulate observations, update their data tracking sheets, and formulate preliminary ratings.

Table 2-21. Participants for Consolidate Data from Practitioners..
Participants for Consolidate Data from Practitioners.;. Participants
for Consolidate Data from Practitioners.;{ TC "Table 2-21.
Participants for Consolidate Data from Practitioners." \1 1 }

Typical duration One hour

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2.2.7 Consolidate Data from Practitioners, Continued

Step

Table 2-22 shows the steps for this process element.

Step	Guidance
Review notes	Each team member privately reviews his/her notes from the practitioner interviews, committing issues to post-its.
Update DTS	Each team member updates his/her data tracking sheets by adding a plus (+) or minus (-) to those base/generic practices for which corroborating or opposing evidence was heard.
Discuss issues	Team members raise issues that they have encountered during the review and update steps. The facilitator moderates the discussions to give each issue a chance to be aired. At the end of the discussion, team members may wish to alter their entries to their data tracking sheets.
Form preliminary ratings	<p>Based on their data tracking sheets, the appraisal team forms a preliminary rating for each process area. A capability level is considered achieved if, in the opinion of the team members, 100% of the base/generic practices of that level are performed. To achieve level 1, 90% of the base practices, across the appraisal entity as a whole, must be performed. For levels 2 through 5, 50% of the generic practices associated with that level must be performed across the organization.</p> <p>It is not critical that the team achieve consensus at this time; however, plans must be made for resolving any conflicts. In this case, preliminary findings can be crafted to explore any open issues further.</p>
Preparation	The team discusses the upcoming events and any alterations that they may wish to make based on the previous discussions. In particular, the team may wish to add a few exploratory questions or special findings to the preliminary findings in order to resolve conflicting evidence, especially where the ratings are affected.

Table 2-22. Steps for Consolidate Data from Practitioners.. Steps for Consolidate Data from Practitioners.; Steps for Consolidate Data from Practitioners.;{ TC "Table 2-22. Steps for Consolidate Data from Practitioners." \ 1 }

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2.2.7 Consolidate Data from Practitioners, Continued

Tailorable parameters

- Initial rating profile is developed (may be deferred).

Exit criteria

- DTS are updated.
- Scheduling and data gathering changes are agreed to where appropriate.

Notes

See Appendix C for details on the format and suggested use of the data tracking sheets.

It is recommended that each team member copy issues (strengths and weaknesses) to post-its as notes are reviewed. The affected PA and team member's initials should be included together with the session in which the issue was recorded. A typical team member generates 30-100+ issues, and can generate 250-400 total.

2.2.8 Develop Preliminary Findings

Element title/tag 2.2.8 Develop Preliminary Findings (PF)

Purpose The purpose of Develop Preliminary Findings is to formulate a set of findings that reflect an initial synthesis of the accumulated data from all data sources used in the appraisal.

Summary description During Develop Preliminary Findings, the appraisal team systematically analyzes the data from all sources to generate a list of preliminary findings related to the process areas and capability levels under investigation.

Major participants Table 2-23 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Facilitator	Leads team in brainstorm activities and oversees the preparation of the preliminary findings.
Appraisal team	Synthesize the accumulated data into preliminary findings, including both strengths and weaknesses.

Table 2-23. Participants for Develop Preliminary Findings..
Participants for Develop Preliminary Findings.; **Participants for**
Develop Preliminary Findings.;{ TC "Table 2-23. Participants for
Develop Preliminary Findings." \ 1 }

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2.2.8 Develop Preliminary Findings, Continued

Steps

Table 2-24 shows the steps for this process element.

Step	Guidance
Individual appraisal team members record their candidate preliminary findings according to process areas/common features	An easy way to record candidate findings is to record them on post-it notes along with the process area or common feature tag and author initials. You can show their affinities by placing the notes either on a long table or on multiple flip charts (one per PA).
Mini-teams collate the findings, eliminate redundancies, and look for common threads	Teams of two work well to narrow the initial set by clustering to a number that the entire team can review. The teams can move to the next process area in line after they are done with their first one, and so on until all are clustered.
Mini-teams present candidates to entire team for consensus on findings to put forth	Consensus here is more of the nature of, "Can I live with the systems engineering team leads' agreement or disagreement?" rather than "I can agree with this." Remember, not all the findings will be validated by the feedback sessions.
Preliminary findings are recorded for use in the feedback sessions for the next day	We recommend that you use a flat file database, such as a word processor, to record the findings according to process area/common feature with a form that allows room for notes from the feedback session. This makes it easy for the team to record notes the following day.

Table 2-24. Steps for Develop Preliminary Findings.. Steps for Develop Preliminary Findings.;. Steps for Develop Preliminary Findings.;{ TC "Table 2-24. Steps for Develop Preliminary Findings." \l 1 }

Typical duration Three to six hours

Tailorable parameters

- Level of granularity of preliminary findings.
- Number of preliminary findings presented for validation.

Exit criteria

- 40-60 preliminary findings that can be verified with the systems engineering leads.

Notes One PA per flipchart is recommended with an additional flipchart each for "strengths" and "not in model" issues.

2.2.9 Review Preliminary Findings

Element title/tag 2.2.9 Review Preliminary Findings

Purpose The purpose of Review Preliminary Findings is to obtain feedback on the preliminary findings from the systems engineering leads who provided the original data.

Summary description Review Preliminary Findings involves feeding back the synthesized data in the form of strengths and weaknesses to the same systems engineering leads who were the original sources of the data.

Major participants Table 2-25 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Session facilitator	Presents preliminary findings to the systems engineering leads for their comment. If possible, the session facilitator role should be filled by the appraisal team leader to increase his/her comfort with explaining the findings.
Session recorder	Tracks session and monitors time. If the team leader is the session facilitator, the trained facilitator should act as the session recorder.
Systems engineering lead	Provides feedback on preliminary conclusions.
Appraisal team	Takes notes.

Table 2-25. Participants for Review Preliminary Findings..
Participants for Review Preliminary Findings.; **Participants for**
Review Preliminary Findings.;{ TC "Table 2-25. Participants for
Review Preliminary Findings." \ 1 }

Typical duration One hour per project

continued on next page

2.2.9 Review Preliminary Findings, Continued

Steps

Table 2-26 shows the steps for this process element.

Step	Guidance
Introduction	<p>The session facilitator welcomes the systems engineering lead and describes what the team has done since the last meeting. He/she describes the purpose of this session and explains that the findings are preliminary and will likely change; therefore, it is especially important not to discuss this version of the findings outside of this review.</p> <p>The facilitator also tells the lead that at the end of the session he/she will ask for a strength and an important change in the appraised entity.</p>
Review findings	<p>The session facilitator presents each preliminary finding to the systems engineering lead and asks whether he/she believes that the finding is true on their project and whether he/she believes it is generally true for the appraised entity.</p> <p>The facilitator or members of the team can ask for clarification or a follow-on question. However, <i>all</i> preliminary findings need to be presented in the allocated time. Therefore, the facilitator and recorder need to keep a tight rein on the time and not let follow-up questions jeopardize the schedule.</p>

Table 2-26. Steps for Review Preliminary Findings.. Steps for Review Preliminary Findings.; Steps for Review Preliminary Findings.;{ TC "Table 2-26. Steps for Review Preliminary Findings." \ 1 }

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2.2.9 Review Preliminary Findings, Continued

Steps, continued

Step	Guidance
Closing	<p>The session facilitator closes the session by asking the systems engineering lead the following question:</p> <p><i>If you could change one thing in your organization other than your boss or your paycheck, what would it be?</i></p> <p>Next the facilitator asks:</p> <p><i>Other than the people, what do you think is this organization's major strength?</i></p> <p>Note the word "organization" should be customized for the situation.</p> <p>Finally, the session facilitator thanks the systems engineering lead for participating and reminds him/her of the time and location for presenting the draft findings.</p>
Process check	<p>In the interval between interviews, the team should perform a brief process check of how the last interview went, and discuss any changes or special situations anticipated with the next systems engineering lead. Again, be sure to leave time for a visit to the bathroom and back before the next lead arrives.</p>

Table 2-26. Steps for Review Preliminary Findings, continued.
Steps for Review Preliminary Findings, continued; **Steps for Review Preliminary Findings, continued;**{ TC "Table 2-26. Steps for Review Preliminary Findings, continued" \ 1 }

Tailorable parameters

- Documentation may be requested and reviewed.
- SE leads may be provided a table of preliminary findings and check yes/no for project and organization on paper; the session facilitator then asks if there are any questions.
- SE leads may review preliminary findings in parallel sessions, providing teams of two (facilitator and recorder) attend each.

Exit criteria

- Feedback on the applicability of the preliminary findings has been obtained.
- Potential modifications to findings are noted by the team.

Notes

None.

2.2.10 Develop Draft Rating

Element title/tag 2.2.10 Develop Draft Rating (DR)

Purpose The purpose of Develop Draft Rating is to assimilate the notes taken during the review of preliminary findings and to formulate a draft set of ratings for each process area.

Summary description Develop Draft Rating involves preparing to synthesize the preliminary findings into a set of draft findings that form the core of the findings briefing to be presented to the appraisal participants. In addition, this is the point at which the appraisal team must reach consensus on the draft rating profile.

Major participants Table 2-27 lists the primary roles involved in this process element and the summary of their activity during this process.

Role	Summary
Facilitator	Provides guidance and model expertise for the team's deliberations.
Appraisal team	Review their notes, discuss any issues, formulate observations, update their data tracking sheets, and formulate draft ratings.

Table 2-27. Participants for Develop Draft Rating.. Participants for Develop Draft Rating.;. Participants for Develop Draft Rating.;{
TC "Table 2-27. Participants for Develop Draft Rating." \ 1 }

Typical duration One to two hours

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2.2.10 Develop Draft Rating, Continued

Steps

Table 2-28 shows the steps for this process element.

Step	Guidance
Review notes	Each team member privately reviews his/her notes from the interview with the systems engineering leads.
Update DTS	Each team member updates his/her data tracking sheets by adding a plus (+) or minus (-) to those base/generic practices for which corroborating or opposing evidence was heard.
Discuss issues	Team members raise issues that they have encountered during the review step. The facilitator moderates the discussions to give each issue a chance to be aired. At the end of the discussion, team members may wish to alter the entries on their data tracking sheets.
Draft ratings	<p>Based on their data tracking sheets, the appraisal team forms a preliminary rating for each process area. A capability level is considered achieved if, in the opinion of the team members, the base/generic practices for that level are performed. To achieve level 1, 100% of the base practices must be performed. For levels 2-5, the generic practices associated with that level must be performed (but 80% may be an acceptable standard).</p> <p>At this point in the appraisal process, team consensus on the ratings is necessary. The facilitator leads the process of building consensus. In the unlikely event that consensus cannot be achieved, the team must develop a plan for presenting the draft findings that will allow final resolution of the ratings, based on practitioner and SE lead input.</p>
Preparation	The team discusses the upcoming events and any alterations that they may wish to make based on the previous discussions. In particular, the team may wish to include additional slides with the draft findings briefing.

Table 2-28. Steps for Develop Draft Rating.. Steps for Develop Draft Rating.; Steps for Develop Draft Rating.:{ TC "Table 2-28. Steps for Develop Draft Rating." \ 1 }

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2.2.10 Develop Draft Rating, Continued

Tailorable parameters

- This step would not include ratings development if the appraisal context excludes the rating profile from the appraisal results.

Exit criteria

- Consensus is obtained on the draft rating profile.

Notes

See Appendix B for rating profile example.

2.2.11 Develop Draft Findings

Element title/tag 2.2.11 Develop Draft Findings (DF)

Purpose The purpose of Develop Draft Findings is to focus on a subset of the process areas and to develop refined findings for each process area investigated in the appraisal.

Summary description Develop Draft Findings involves analyzing the preliminary conclusions in light of the contents of the capability levels, determining the estimated process capability for each process area that was investigated, and synthesizing the preliminary findings into a manageable set for presentation to the sponsor. The preliminary findings are synthesized from around 45-50 findings into 5-10 draft findings that address findings, data, and consequences.

Major participants Table 2-29 lists the primary roles involved in this process element and the summary of their activity during this process.

Role	Summary
Facilitator	Provides expertise on the SE-CMM and guides the team in forming consensus.
Appraisal team	Forms consensus for the final findings and estimated process capability levels.

Table 2-29. Participants for Develop Draft Findings.. Participants for Develop Draft Findings.;. Participants for Develop Draft Findings.;{ TC "Table 2-29. Participants for Develop Draft Findings." \l 1 }

Typical duration Four to eight hours

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2.2.11 Develop Draft Findings, Continued

Steps

Table 2-30 shows the steps for this process element.

Step	Guidance
Review data	<p>The team should review the draft ratings and the systems engineering leads' responses to the preliminary findings. This information should allow the team to identify areas for findings. The process areas are a good starting point, but the appraisal is not limited to findings that exactly match the SE-CMM process areas. There are sometimes local issues that must be addressed if the appraisal is to have credibility with the participants.</p> <p>The number of findings should be limited to at least five, but no more than nine. Too many findings will be discouraging and difficult to address; too few will encourage false confidence and not provide a rich enough set of issues for planning process improvement.</p> <p>Initially the team may identify more than nine areas, with the understanding that it will merge or drop some later.</p>
Prioritize findings	<p>There are usually more than 10 synthesized findings to start. Prioritization should be based on business goals, if available, or on the team's consensus on the major barriers to improvement in the organization.</p>
Wordsmith	<p>The team should form small groups (two to three people) to edit and wordsmith the findings. This is especially true if they could not agree on the wording during the previous step.</p> <p>The facilitator should carefully consider the make-up of these groups and the assignment of findings. Sometimes it is a good idea to place antagonists in the same group and give them the controversial finding to edit. Other times, neutral parties should do the editing. In extreme cases both approaches might be tried. This is where the facilitator makes use of his/her teaming skills and knowledge of the team.</p>

Table 2-30. Steps for Develop Draft Findings.. Steps for Develop Draft Findings.; Steps for Develop Draft Findings.;

{ TC "Table 2-30. Steps for Develop Draft Findings." \l 1 }

continued on next page

2.2.11 Develop Draft Findings, Continued

Steps, continued

Step	Guidance
Form consensus	<p>Finally, each finding is presented to the group for final edit and approval. The team <i>must</i> agree with each finding. If team members go away from the appraisal without full commitment to all of the findings, the other participants will sense the lack of consensus and interpret it as a weakness in the findings.</p> <p>This step continues until consensus is achieved. If necessary, the team might have to go back to the previous step in an effort to come to an agreement.</p>
Prepare slides	<p>The findings are placed on slides for presentation. See Appendix B for a sample of the findings presentation slides. The team members should be given copies of the draft findings for their notebook, and for recording comments from the draft presentation. Do not make copies for the participants, as the findings may change after their initial presentation. The appraisal team leader should take a copy with him/her in order to prepare for the presentation the next morning.</p>

Table 2-30. Steps for Develop Draft Findings, continued. Steps for Develop Draft Findings, continued;. Steps for Develop Draft Findings, continued;{ TC "Table 2-30. Steps for Develop Draft Findings, continued" \l 1 }

Tailorable parameters

- Level of granularity of findings.
- Depth of analysis for determining capability level.

Exit criteria

- Consensus is obtained on draft findings.
- Draft findings briefing is completed.

Notes

Findings may be presented in the context of process area categories, process areas, base practices, generic practices, common features, or capability levels, depending on the appraisal goals.

2.2.12 Present Draft Findings

Element title/tag 2.2.12 Present Draft Findings (PF)

Purpose The purpose of Present Draft Findings is to provide a vehicle for the systems engineering leads and practitioners to validate that the synthesized findings represent the information provided throughout the on-site phase of the appraisal.

Summary description Present Draft Findings involves the appraisal team leader (ATL) presenting the synthesized findings to the systems engineering leads as a group, and then to all the practitioners as a group. This provides the appraisal team leader with an opportunity to "rehearse" the briefing, and provides the appraisal participants with the opportunity to provide feedback on the validity of the information.

Major participants Table 2-31 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Appraisal team leader	Presents the draft findings; does <i>not</i> present the rating profile or the introductory material, just the summarized findings; solicits comments from participants.
Appraisal team	Takes notes on presentation for feedback to appraisal team leader; observes reactions of participants to findings; takes notes on feedback.
Appraisal participants	Listen to findings presentation; provide feedback on whether the appraisal team captured what is happening in the organization.
Session recorder	Records agreed-upon changes to briefing on actual slides directly, as well as on a hard copy.
Session facilitator	Facilitates the feedback portion of the meeting; appraisal team leader may assume this role if desired.

Table 2-31. Participants for Present Draft Findings.. Participants for Present Draft Findings.;. Participants for Present Draft Findings.;{ TC "Table 2-31. Participants for Present Draft Findings." \ 1 }

Typical duration One hour for systems engineering leads as a group
One hour for all practitioners as a group

continued on next page

2.2.12 Present Draft Findings, Continued

Steps

Table 2-32 shows the steps for this process element.

Step	Guidance
Describe purpose of session	The presenter re-emphasizes that the goal of the appraisal is to capture the "state of the practice" in the appraised entity; this session allows the appraisal team to validate that they have accurately captured the practitioners' viewpoint. The presenter then asks to go through entire briefing and then come back to questions. It is not recommended to pass out a copy of the briefing at this time; it is subject to change, and incorrect versions of the briefing could damage the credibility of the appraisal.
Present findings	Appraisal team leader rehearses his/her presentation of the findings portion of the briefing. Not showing the rating profile also gives participants another reason to attend the main findings briefing. During this briefing, the presenter tries to notice the reactions he/she gets from different findings.
Solicit feedback	After the run-through of the findings, the appraisal team leader solicits feedback from the practitioners, e.g., "Is this what you told us and is this worded in a way to get positive action from management?" The ATL facilitates the discussion, and when changes are proposed by a member of the practitioner's group, the ATL tries to get a sense of the agreement within the group; there will not be time to get a full consensus, the ATL will just try to make sure that the comment is one that engenders general agreement. The appraisal team is not looking for a lot of changes, but is just making sure that the tone of the findings is able to be acted upon, and that the team is not misrepresenting the data that were gathered.

Table 2-32. Steps for Present Draft Findings.. Steps for Present Draft Findings.; Steps for Present Draft Findings.;{ TC "Table 2-32. Steps for Present Draft Findings." \ 1 }

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2.2.12 Present Draft Findings, Continued

Steps, continued

Step	Guidance
Make draft changes	Draft changes can be made directly on the actual slide, so participants can see the direct effect of their input; they should also be recorded on a hard copy or electronic copy for discussion among the team. (These draft changes will be validated in the next process element.)
Provide reminders	The ATL reminds participants of the time for the findings briefing and emphasizes that this is an opportunity to interact with the management who sponsored the appraisal. The ATL asks the practitioners to keep findings to themselves until after the findings briefing. This gives sponsors a chance to respond to the findings without the "rumor mill" interfering.
Adjourn meeting	The ATL thanks participants for their participation throughout the week.

Table 2-32. Steps for Present Draft Findings, continued. Steps for Present Draft Findings, continued;. Steps for Present Draft Findings, continued;{ TC "Table 2-32. Steps for Present Draft Findings, continued" \l 1 }

Tailorable parameters

- Systems engineering lead and practitioner groups could conceivably be combined, though this risks inhibition of the practitioners in some environments. If a management practitioner group was used, you may want to combine them with the systems engineering leads.
- Someone other than the appraisal team leader may be selected as the presenter for the findings briefing, or the presentation may be split between multiple presenters. A common split is to have the facilitator present the introduction, the appraisal team leader present the findings, and the facilitator close with the "next steps." Presentation by the appraisal team leader has the advantage of organizational "ownership" of the material; in some environments, the facilitator has the advantage of being the outside "independent" expert. The decision of who presents the findings should be based on the team's consensus of who will have the most impact and achieve the most momentum for improvement action.

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2.2.12 Present Draft Findings, Continued

Exit Criteria

- Presentation of draft findings complete.
- Practitioner concerns recorded.

Notes

This session is important in establishing the credibility of the appraisal with the practitioners and for providing practitioners with momentum toward change. It is important to make sure there are no findings where the systems engineering leads/practitioners say, "This is absolutely not true — whatever gave you that idea?" or something similar. There should not be many changes that come out of these presentations, but you should put a couple in, even if they are minor details, just to show the team's willingness to listen.

2.2.13 Adjust Draft Findings

Element title/tag 2.2.13 Adjust Draft Findings (AD)

Purpose The purpose of Adjust Draft Findings is to ensure that the final findings briefing accurately reflects the information obtained from the participants by refining the findings briefing based on feedback from the appraisal participants.

Summary description Adjust Draft Findings involves the appraisal team discussing the presentation of the draft findings to the appraisal participants and coming to consensus on the draft changes that will be incorporated into the final findings briefing. The final findings briefing is updated to reflect the accepted changes. Also, at this time any final adjustments to the rating profile are made, if appropriate. The team provides feedback on the dry-run to the appraisal team leader, who will be presenting the findings, to help him/her refine the delivery of the findings.

Major participants Table 2-33 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Appraisal team	Discusses the proposed changes and comes to consensus on them; provides feedback to the ATL on the delivery of the findings.
Appraisal team leader	Accepts feedback on the presentation of the findings and rehearses rough points, where necessary; ensures that consensus on the proposed changes is achieved.
Session recorder	Incorporates the accepted changes into the final findings briefing.
Appraisal support personnel	Prepare slides and enough copies of the final briefing for the sponsor and the appraisal team, plus a few extra in case the sponsor wants extras for his/her own distribution.

Table 2-33. Participants for Adjust Draft Findings.. Participants for Adjust Draft Findings.;. Participants for Adjust Draft Findings.;{ TC "Table 2-33. Participants for Adjust Draft Findings." \l 1 }

continued on next page

2.2.13 Adjust Draft Findings, Continued

Typical duration Two to four hours

Steps Table 2-34 shows the steps for this process element.

Step	Guidance
Review draft changes	Obtain consensus on the proposed changes provided by the participants. Not all changes must be accepted; particularly, ones that do not add to the global issues of the appraisal may not be accepted. The team must agree on the changes before they are made.
Determine impact on rating profile	Based on what was heard in the findings review, quickly review the rating profile to ensure that it is still valid (99% of the time it will be fine, but you want to make sure findings stay consistent with the profile). If necessary, come to consensus on rating profile changes.
Discuss delivery of findings	Team members may provide hints on the delivery of the findings to the ATL for consideration in making the message come across more clearly or simply. The ATL may rehearse alternate approaches to delivering findings that prove sensitive or more difficult to articulate.

Table 2-34. Steps for Adjust Draft Findings.. Steps for Adjust Draft Findings.;. Steps for Adjust Draft Findings.;{ TC "Table 2-34. Steps for Adjust Draft Findings." \l 1 }

continued on next page

2.2.13 Adjust Draft Findings, Continued

Steps, continued

Step	Guidance
Produce final findings briefing	Red-line changes are made to the original if red-lines are being presented, or the electronic file with the briefing is updated. At this point, ensure that all the other pieces of the briefing (the introduction, rating profile, and next steps) are incorporated into the final copy. Appraisal support personnel make the required number of slides and hard copies. Unless otherwise established ahead of time, only copies for the sponsor and appraisal team are made. Frequently, sponsors wish to control distribution of the findings briefing. To provide a copy to those who want one, while still retaining a measure of control over distribution, we suggest having a sign-in sheet at the findings meeting with a place to check if people want a copy of the briefing.

Table 2-34. Steps for Adjust Draft Findings, continued. Steps for Adjust Draft Findings, continued;. Steps for Adjust Draft Findings, continued;{ TC "Table 2-34. Steps for Adjust Draft Findings, continued" \l 1 }

Tailorable parameters

- The findings briefing may either be revised electronically so a "fresh" copy is presented, or a red-lined copy of the draft briefing may be used, depending on the culture and support resources available. (Doing a fresh copy implies in-team computing support which may or may not be available.)

Exit criteria

- Ratings profile is finalized.
- Final findings briefing is prepared for delivery to participants.

Notes

Be sure the ATL is comfortable delivering the briefing. The two rehearsals provided by the draft findings briefing are usually sufficient to reduce the nervousness of presenting to the sponsor.

2.2.14 Present Final Briefing

Element title/tag 2.2.14 Present Final Briefing (PB)

Purpose The purpose of Present Final Briefing is to provide the sponsor with the agreed-upon data from the appraisal and determine next steps for use of the findings (e.g., catalyst for process improvement effort or selection of supplier).

Summary description Present Final Briefing involves presenting the results of the appraisal to the sponsor and usually to the other appraisal participants via a briefing that synthesizes the data in a non-attributable form and provides prioritized findings.

Major participants Table 2-35 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Appraisal team leader	Presents the findings and rating profile to the sponsor. Facilitates any discussion after the briefing.
Appraisal team	Notes feedback from sponsor.
Sponsor	Accepts findings of appraisal from team; prioritizes actions to be taken based on appraisal results.
Appraisal participants	Listen to appraisal results.

Table 2-35. Participants for Present Final Briefing.. Participants for Present Final Briefing.;. Participants for Present Final Briefing.;{ TC "Table 2-35. Participants for Present Final Briefing." \l 1 }

Typical duration One to two hours

continued on next page

2.2.14 Present Final Briefing, Continued

Steps

Table 2-36 shows the steps for this process element.

Step	Guidance
Coach sponsor on his/her expected participation in meeting	Remind sponsor that his/her reaction to the findings will have an impact on the enthusiasm with which follow on actions are greeted.
Remind all of purpose of meeting	Remind participants that they have already had opportunities for feedback – the gist of this session is to summarize what has been found during the week.
Thank sponsor and participants for cooperation in the appraisal	Acknowledge the support personnel and all those who helped the appraisal succeed.
Present final briefing	The presenter goes through the entire briefing, including process capability profile and next steps; presenter asks for questions to be held until the end.
Open discussion, if appropriate	Usually at the end of the briefing, the sponsor does a "thank you" message, provides initial reaction, and then opens with his/her own questions or opens the discussion to the floor.

Table 2-36. Steps for Present Final Briefing.. Steps for Present Final Briefing.; { TC "Table 2-36. Steps for Present Final Briefing." \ 1 }

Tailorable parameters

- Number and type of participants in audience.
- Level of detail of findings.
- Presenter: in some cases, having the facilitator present the process of coming to the findings and the team leader present the content of the findings may work best (see tailorable parameters in Present Draft Findings).

Exit criteria

- Final briefing presentation completed.
- Participant questions answered, or recorded as actions.

Notes

See Appendix B for rating profile example

2.2.15 Brief Sponsor (optional)

Element title/tag 2.2.15 Brief Sponsor (BS)

Purpose The purpose of Brief Sponsor is to provide the sponsor with an opportunity to ask questions privately, obtain or provide feedback on the appraisal process, and discuss next steps in more detail.

Summary description Brief Sponsor involves the appraisal team members and sponsors having an open discussion on the results of the appraisal, the appraisal process, and/or the next steps, as appropriate. No confidentiality rules are abrogated in this meeting.

Major participants Table 2-37 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Facilitator	Asks sponsor if any clarification or other information is needed, suggests follow-on assignments.
Appraisal team	Answer sponsor's questions, as appropriate.
Sponsor	Asks any questions not appropriate for a general audience; makes follow-up assignments.

Table 2-37. Participants for Brief Sponsor.. Participants for Brief Sponsor.;. Participants for Brief Sponsor.;{ TC "Table 2-37. Participants for Brief Sponsor." \l 1 }

Typical Duration Thirty minutes to one hour

continued on next page

2.2.15 Brief Sponsor (optional), Continued

Steps

Table 2-38 shows the steps for this process element.

Step	Guidance
Ask sponsor for feedback on results	Often the sponsor has questions of clarification that he/she prefers not to ask in a large group; even if there are no specific questions, this is a good time to gauge the sponsor's reaction – sometimes the results are right in line with the sponsor's prior thinking, sometimes they are a surprise.
Ask sponsor for feedback on process	Any feedback from the sponsor on the appraisal process should be included in the lessons learned that are returned to the SE-CMM maintenance site.
Discuss next steps and add detail	At this point the assignments for follow-on work should be finalized. The facilitator may provide some advice on how long the follow-up activities will be expected to take and the level of commitment required to finish the report and start to develop an improvement plan.

Table 2-38. Steps for Brief Sponsor.. Steps for Brief Sponsor.; Steps for Brief Sponsor.; { TC "Table 2-38. Steps for Brief Sponsor." \ 1 }

Tailorable parameters

- This is an optional process element, so it may be tailored out if appropriate.

Exit criteria

- Sponsor dismisses team.

Notes

This is an optional step, but is frequently used as a way to ensure sponsor follow-through and assignment of actions. It also provides the sponsor with an opportunity to get a better understanding of the findings which he/she may not have been comfortable discussing in the large meeting.

2.2.16 Conduct Wrap-Up

Element title/tag 2.2.16 Conduct Wrap-Up (CW)

Purpose The purposes of Conduct Wrap-Up are to obtain feedback from the appraisal team on the appraisal process itself, provide an opportunity for consulting with the facilitator on moving forward with the results, and ensure that appraisal materials are properly accounted for.

Summary description Conduct Wrap-Up involves obtaining information about what worked and what did not work from the appraisal team members for feeding back to the SAM maintainers. It also involves discussing and resolving findings and assignments from the recommendation report.

Major participants Table 2-39 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Facilitator	Facilitates gathering data on what worked and did not work during the appraisal.
Appraisal team members	Provide input into what worked and what didn't work.

Table 2-39. Participants for Conduct Wrap-Up.. Participants for Conduct Wrap-Up.; Participants for Conduct Wrap-Up. ;{ TC "Table 2-39. Participants for Conduct Wrap-Up." \l 1 }

Typical duration One hour

continued on next page

2.2.16 Conduct Wrap-Up, Continued

Steps

Table 2-40 shows the steps for this process element.

Step	Guidance
Conduct appraisal data gathering session	Getting the team to write "what worked" and "what didn't work" post-it notes provides an easy way to gather data and provide an affinitized list of improvement suggestions to the maintenance site -- what did work is just as important, so that successful elements of SAM don't get lost in future revisions
Verify findings and recommendations	If there were areas of disagreement that came out as a results of the final briefing, this time can be used to resolve how the finding will be presented in the appraisal report
Report assignments detailed	All appraisal team members should understand their commitments to the findings & recommendations report and their deadlines.
Answer last-minute questions	Often appraisal team members have questions about improvement plans, etc., that the facilitator can spend some time answering and/or providing references for.

Table 2-40. Steps for Conduct Wrap-Up.. Steps for Conduct Wrap-Up.; TC "Table 2-40. Steps for Conduct Wrap-Up." \1 1 }

Tailorable parameters

- Amount of time spent in discussing lessons learned.

Exit criteria

- Appraisal lessons learned are recorded.
- Assignments are verified.

Notes

Depending on the team, there may be resistance to the wrap-up session (everybody wants to go home and get some sleep!!! . . . or catch a plane, etc.). The facilitator should judge how in-depth to make this session based on the state of the team. A celebration of some sort is not out of place if the team members are available. (Often, however, the facilitators have planes to catch.)

2.3 Post-Appraisal

Element title/tag 2.3 Post-Appraisal (PO)

Purpose The purpose of the Post-Appraisal phase is to finish preparing the appraisal reports, document lessons learned in the appraisal, and provide recommendations for action planning. Figure 2-4 shows the steps in the Post-Appraisal phase.

Diagram

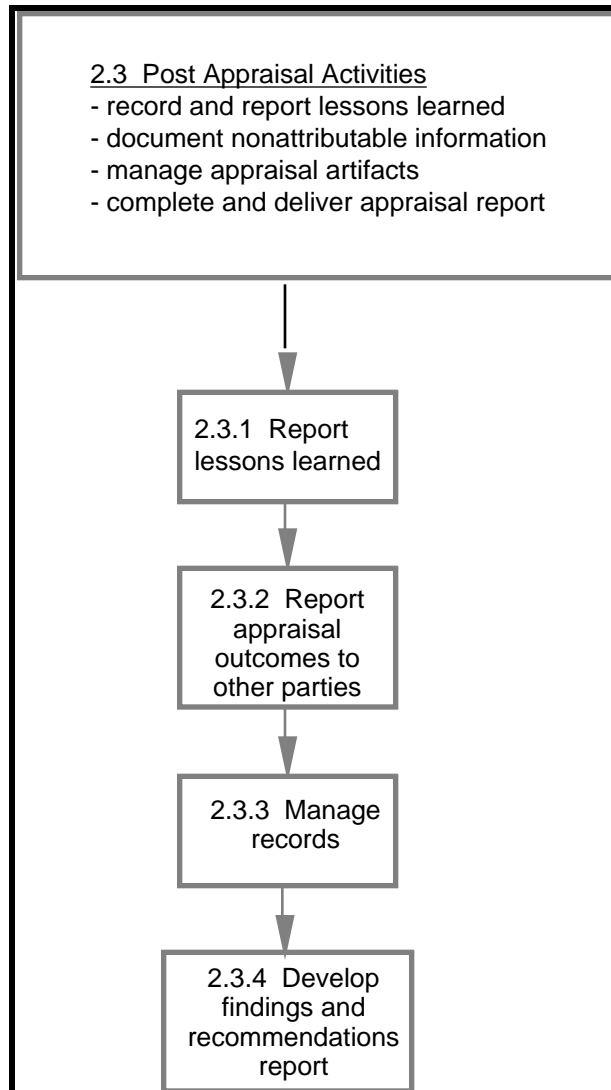


Figure 2-4. Diagram of Post-Appraisal Phase.. Diagram of Post-Appraisal Phase.;. Diagram of Post-Appraisal Phase.;;{ TC "Figure 2-4. Diagram of Post-Appraisal Phase." \ 1 }

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2.3 Post-Appraisal, Continued

Summary description

Table 2-41 shows the steps for this process element.

ID	Activity	Description
2.3.1	Report lessons learned	Record lessons learned, risks avoided and/or encountered, and suggestions for improving the method to the SE-CMM maintenance site.
2.3.2	Report appraisal outputs to other parties	Identify appraisal data in a way that maintains confidentiality (i.e., "sanitize" the data) and provide to organization(s) gathering state-of-the-practice data, if agreed upon in the preparation phase.
2.3.3	Manage records	Properly dispose of intermediate and final data generated by the appraisal.
2.3.4	Develop findings-recommendation report	Expand findings briefing into a report; add recommendations.

Table 2-41. Summary Description of Post-Appraisal Phase..
Summary Description of Post-Appraisal Phase.; **Summary**
Description of Post-Appraisal Phase.;{ TC "Table 2-41. Summary

Description of Post-Appraisal Phase." \l 1 }

Typical duration

Two to four weeks

Tailorable parameters

- Reporting of appraisal data to other parties (e.g., SE-CMM maintenance site) must be negotiated and agreed upon in the preparation phase.

Exit criteria

- Lessons learned reported back to SE-CMM maintenance site.
- Appraisal report completed and distributed appropriately.
- Records disposed of in accordance with the appraisal plan.

Notes

One of the typical traps in getting an improvement effort started is allowing the release of the appraisal report to drag out.

2.3.1 Report Lessons Learned

Element title/tag 2.3.1 Report Lessons Learned (LL)

Purpose The purpose of Report Lessons Learned is to provide SAM maintainers with feedback on the strengths and weaknesses in the description of the method and model, and provide opportunities for improving the method and model.

Summary description Report Lessons Learned involves describing the appraisal goals and tailoring decisions made by the team, and recording any effects (positive or negative) of either the described or implemented method.

Major participants Table 2-42 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Facilitator	Synthesizes and records lessons learned from appraisal participation.
SAM maintenance site	Accepts and addresses comments from appraisal team.

Table 2-42. Participants for Report Lessons Learned..
Participants for Report Lessons Learned.; **Participants for Report Lessons Learned.;**{ TC "Table 2-42. Participants for Report Lessons Learned." \l 1 }

Typical duration Two hours (to write and send lessons learned information)

Tailorable parameters

- Level of detail of recommendations.

Exit criteria

- Lessons learned sent to SAM maintenance site.

Notes Feedback received from appraisal teams will be a primary input to revisions and enhancements to SAM.

Feedback may be as simple as a set of post-it notes, or as elaborate as a formal white paper.

2.3.2 Develop and Present Action Plans

Element title/tag 2.3.2 Develop and Present Action Plans (AP)

Purpose The purpose of action planning is to provide management and the appraisal sponsor with feasible, prioritized activities, costs, and schedules descriptions that are likely to be implemented; and to deliver intended improvements from the perspectives of the organization's technical and managerial levels .

Summary description Action planning requires willing and collaborative representatives from affected groups in the organization to develop realistic task descriptions, resource cost estimates, schedules, and perform risk assessments before submitting the plans for approval and implementation by the sponsor or management. The plans need not be long or detailed, but must motivate the people who must lead, do, and support the plans to implement them and provide sufficient guidance to do so.

Major participants Table 2-43 lists the primary roles involved in this process element and a summary of their activity during the process.

Role	Summary
Action planners	Develop action plans to implement prioritized recommendations and prioritize the actions to maximize impact and buy-in from the organization.

Table 2-43. Participants for Report Appraisal Output to Other Parties.;Table 2-43. Participants for Report Appraisal Output to Other Parties.

Typical duration • Two days to four weeks.

Tailorable parameters • Level of detail provided. At the low end, only title, objective (observable or measurable), linkage to finding/recommendation, task list, resources to accomplish, PERT, and force field analysis (pros/cons risk assessment) are required. At the top end, this could be a significant portion of an organization's annual tactical or operational planning.

Notes The levels of detail, resources, and schedule to do this planning are to be negotiated during the preparation phase with the sponsor.

2.3.3 Perform Actions

Element title/tag 2.3.3 Perform Actions (PA)

Purpose The purpose of Perform Actions is to implement or deploy the approved action plans.

Summary description Perform Actions involves the sponsor and affected groups (including management) reviewing the action plans, and identifying resources and appropriate start dates for those efforts approved. Then deploying the resources according to the plan(s) and tracking and overseeing them like any other project (see PA11: Monitor and Control Technical Effort).

Major participants Table 2-44 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Sponsor	Accepts, prioritizes, and provides resources and leadership to implement the plan(s).
Action Plan team(s)	In accordance with project PAs herein, perform action plans to achieve expected results.

Table 2-44. Participants for Manage Records..c.;Table 2-44. Participants for Manage Records.

Typical duration • From a few weeks to an ongoing effort each (from 3 to 5 distinct improvement action plans are typical outputs of an appraisal)

Tailorable parameters • Many - these will be determined by how the organization uses teams, task forces, inter-disciplinary groups, etc. to deploy changes.

Exit criteria • Plan exit criteria are met (success or failure is achieved).

Notes A good resource for how to deploy change is Peter Scholtes' "Team Handbook."

2.3.4 Develop Findings and Recommendations Report

Element title/tag 2.3.4 Complete and deliver findings and recommendations report (FR)

Purpose The purpose of developing the F&R report is to provide the organization with documentation of root causes of problems that are widely accepted in the organization, and recommendations for actions to remove them.

Summary description The F&R report copies and provides details or explanation of intent beyond the findings slide and process area profile. For each finding, the report is to contain a recommendation that addresses that finding. These recommendations should focus the organization on increasing throughput and decreasing work-in-progress (WIP) in SE processes (process areas as deployed in the organization).

Major participants Table 2-45 lists the primary roles involved in this process element and a summary of their activity during this process.

Role	Summary
Leader	Collects and leads synthesis of recommendations from findings.
Appraisal team	Perform writing assignments and review and provide improvement recommendations to other authors' work.
Facilitator	Acts as a reviewer of the report.

Table 2-45. Participants for Report Lessons Learned.. Participants for Report Lessons Learned.. Participants for Report Lessons Learned.;. Participants for Report Lessons Learned.;
TC "Table 2-45. Participants for Report Lessons Learned." \ 1 }

Typical duration • Four work days over one to three weeks

Tailorable parameters • Level of detail of document and of explanatory material supporting findings and recommendations.

Exit criteria • Report delivered and accepted or approved by sponsor.

Notes We advocate in the F&R template and SAM training pages that Goldratt's "Theory of Constraints" be the basis of improvement recommendations. It focuses recommendation developers on throughput and the elimination sub-optimization conditions that cause work-in-progress to pile up before process bottlenecks. A worksheet including some techniques that might be helpful is included in Appendix E.

Chapter 3: Guidance on Important SAM Processes for Initiating an Appraisal

Purpose

The purpose of this chapter is to provide readers who are contemplating initiating a SAM with information that will help them properly resource and prepare for the appraisal.

Introduction

The preparation phase is typically initiated six to eight weeks prior to the on-site week. The primary activities performed during the preparation phase are

- Establish appraisal objectives.
- Determine boundaries to be placed on the organization for the purpose of establishing the scope of the entity to be appraised.
- Select projects, or major aspects of a project, that will receive the questionnaires.
- Select appraisal team and site coordinator.
- Select systems engineering leads, support functions, and practitioner groups.
- Obtain facilities and support material.
- Coordinate schedules, particularly senior management.
- Administer questionnaire.

A checklist to assist the site coordinator is provided in Appendix F. Many of these issues require guidance to optimize the organization's use of SAM. This chapter provides some of that guidance.

Facilities support

The on-site appraisal phase is very intensive for the appraisal team. To maximize their efficiency, it is recommended that a large conference room which can be secured be made available for the on-site effort. Other critical support facilities include computers, printers, display capability, and reproduction capability. Recommended support facilities include hotel rooms, food, and secretarial support.

Additional appraisal guidance

All three appraisal phases are discussed in detail in Chapter 2, "Process Element Summaries." In each process element, guidance is provided to help appraisers avoid typical pitfalls associated with that process element.

continued on next page

Chapter 3: Guidance on Important SAM Processes for Initiating an Appraisal, Continued

In this chapter

The following table provides a guide to the information found in this chapter.

Topic	See Page
3.1 Using Business Goals in SAM	3-3
3.2 Tailoring SAM Based on Organizational Context	3-4
3.3 Selecting Appraisal Personnel	3-7
3.4 Selecting Projects to be Appraised	3-9
3.5 Tailoring of the On-site Appraisal Schedule	3-11
3.6 Developing the Rating Profile	3-15
3.7 Developing Findings	3-25

3.1 Using Business Goals in SAM

Assumptions

The following discussion presumes that an organization using SAM has a strong set of deployed business goals at its disposal. The creation and deployment of business goals is a task of significant undertaking and is well beyond the scope of this method description.

Refining Appraisal Focus

An organization that has a strong sense of its mission and business goals can optimize the use of SAM by analyzing the model in relation to those goals and deciding on a focus for the appraisal that may be narrower than the entire model, but which can provide more direct and focused information on the process improvement needs of the organization.

Alternatively, a broad focus may still be desired for data gathering; however, the focus of findings and recommendations can be limited to those which directly impact the business goals. This provides the breadth of data gathering that allows management a benchmark of overall capability while still ensuring a focus on improvement that is directly tied to the business needs of the enterprise.

3.2 Tailoring SAM Based on Organizational Context

Many factors influence organizational processes

Figure 3-1 illustrates some of the key influences organization's must face when attempting improvement using any reference model, such as the SE-CMM. The discussion following Figure 3-1 is intended to assist organizations in determining some of the tailoring of the SAM that may be necessary to support improvement in their particular context.

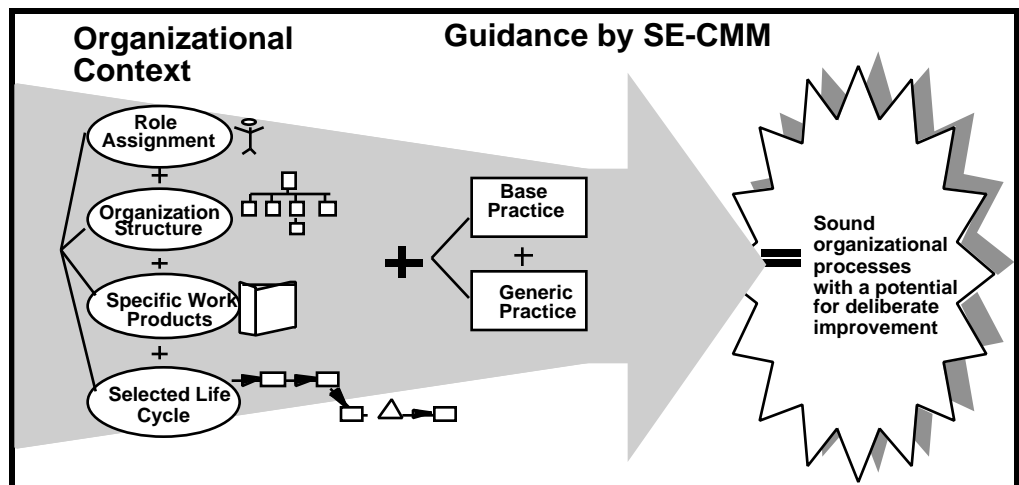


Figure 3-1. Key Influences of Organizational Improvement. . Key Influences of Organizational Improvement. ;. Key Influences of Organizational Improvement. ;{ TC "Figure 3-1. Key Influences of Organizational Improvement. " \1 1 }

Organization structure

To a certain extent, SAM has been designed to optimize appraisal efficiency in an organizational setting that uses projects as the main means of accomplishing work. These projects are assumed to be led by an individual or team who have resource planning, allocation, and monitoring responsibility, as well as responsibility for the quality and quantity of product delivered. Other management and control functions, such as staffing, career development, and administration, may or may not be performed within the project boundaries.

Common organizational structures that adapt well to SAM include a project structure where all management, staffing, and administrative functions come within the purview of the project; a matrix structure, where the project planning, resource, monitoring and performance are the responsibility of the project with staffing and other administration being handled by a "functional" or "central" organization; and integrated product development teams, where teams are created from functional or product line groups which then have the same general responsibilities as a project, but typically for a smaller scope for each team.

In some environments, a functional structure, where the resource planning and control for product development are under the management of a central or functional organization, can be a more challenging environment in which to use SAM to obtain a snapshot of organization-wide systems engineering capability.

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3.2 Tailoring SAM based on Organizational Context, Continued

Using SAM in a functional organization structure

SAM assumes that there is someone, in SAM called the Systems Engineering Leader, who is a single point of information for a broad base of topics related to the systems engineering functions being performed in projects within an organization. If three or four of these SE leads are interviewed using SE-CMM as the reference model, the gaps in information are typically relatively small, and easily filled via the practitioner group discussions.

In some organizations the resource control is held by a functional manager, either related to life cycle, e.g., a requirements manager, design manager, integration manager, etc.; or by product line, e.g., the product line A manager, product line B manager, etc. The "projects" constituted to support this type of organization's needs may be small enough that the ongoing overhead of a project management structure is inefficient, or this structure may support business goals of the organization in some way other structures cannot.

The challenge for applying SAM is in trying to find a single interview source for the broad information gathering needed at the beginning of SAM. This may not be possible. Where infeasible, tailoring the method to achieve the goals of getting both breadth of information typically provided by the SE leads, and depth of information typically provided by the practitioner groups, is the likely alternative. This may entail changing the on-site schedule for the appraisal, re-defining the "organization" being appraised, distributing the questionnaire across a broader range of projects and then selecting interviewees based on the breadth of knowledge exhibited by their questionnaire responses, or other alternatives.

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3.2 Tailoring SAM based on Organizational Context, Continued

Using organizational development resources

Organizational development(OD) is a discipline within the social and decision sciences which attempts to understand the behavior of large and small workgroups, as well as design and execute interventions needed to optimize organizational functioning, enable needed changes to occur, and/or positively influence aberrant organizational behaviors. Many product development enterprises have OD staff, either in the training department, or in a specific organization called Organizational Development or something similar. OD specialists are frequently a valuable source in determining how to tailor SAM for a particular organizational context, especially one that does not immediately appear to follow one of the patterns expected by SAM. They can also be helpful in selecting appraisal team members, appraisal participants, projects, and improvement strategies, as well as help to plan and implement the organizational improvement plan.

OD staff may be particularly helpful in determining the most appropriate project lead/functional management mix for functional style organizations.

Product line focus

Many organizations today are using product lines as a method of defining organizational boundaries. When applying SAM in such an organization, an appraisal focusing within a single product line is likely to produce the most actionable results. Crossing product lines can give a perspective on the overall process strengths and weaknesses of the organization, but is less likely to come up with focused findings that can be leveraged from for significant, timely improvement.

3.3 Selecting Appraisal Personnel

Guidance for selecting the appraisal team

The facilitators and appraisal team members drawn from the organization work as a single team during the entire on-site phase. The appraisal team will analyze data, perform all of the interviews, and develop the findings. They are also responsible for developing the recommendations to the findings which are published in the appraisal report, and should be involved in carrying process improvement activities throughout the organization. To assure transition from the appraisal to a robust improvement effort, the appraisal team members should

- Be advocates of process improvement.
- Be credible with both management and participants.
- Be involved in action planning and the subsequent improvement effort.
- Have good communication skills.
- Have a positive and encouraging attitude.

If the organization has any previous experience with organizational appraisals and ensuing process improvement activities, such as improvement based on the CMM for Software, it can be advantageous to include a person who has been involved in those activities. Such a person brings appraisal experience from within the organizational culture, and can be used as a source to gain leverage from process improvement activities that have worked within the organizational culture. These individuals are also likely candidates to be SAM facilitators.

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3.3 Selecting Appraisal Personnel, Continued

Why use systems engineering leads and practitioners as primary data sources?

The SE-CMM appraisal method is structured to examine two views of the entity being appraised, typically project and organizational support. The objective is to get as broad a view of the organization as possible while still maintaining control of the data gathering process. The project lead systems engineers are typically the only ones who complete the questionnaire since they have a broader view of the tasks being performed in systems engineering and associated support functions than most other roles in a product development. The questionnaires are essential to establishing the basis for data gathering for the entire on-site week. The practitioners expand the appraisers' view of the organization, providing information on what is being done on other projects or areas of the organization besides those targeted for in-depth data gathering. The appraisal team may choose to have select people in the practitioner group complete the questionnaire, but this is typically kept to a limited number for the purpose of data and resource management.

On some appraisals the appraised organization may be a large project. In that situation the "projects" may be large subsystems or segments of the project. The project lead systems engineers would then be the segment lead systems engineers, and the practitioners would be drawn from other project segments.

3.4 Selecting Projects to Be Appraised

Project selection considerations

The types of projects selected to participate in the appraisal are based on the goals of the appraisal. Table 3-1 lists some considerations in selecting projects.

Goal of the Appraisal	Type of Projects to Select
Understand domain-related issues.	Select projects within desired domain. Note that the domain can be focused on any one of the following factors: industry, technology base, customer type, project complexity, etc.
Understand deployment of new organizational practices.	Select new projects that have started since the deployment of new practices.
Determine overall capability of the organization.	Select projects that are expected to be representative of the organizational capability.
Determine progress of process improvement activities.	Select projects that have been the pilots for process improvements.

Table 3-1. Project Selection Considerations.. Project Selection Considerations.; { TC "Table 3-1. Project Selection Considerations." \l 1 }

Project location

Although it is not required by SAM that the projects of an appraisal be near each other geographically, the logistics considerations associated with a multi-site appraisal should be carefully considered. The appraisal interview and feedback process assumes that the interviewers will be available for multiple sessions during the on-site week. Tailoring to accommodate multi-site appraisals should account for the need for the interview/feedback loop if activities are considered for resequencing.

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3.4 Selecting Projects to be Appraised, Continued

Guidelines for selecting practitioner groups

There are two issues associated with the selection of the practitioner groups:

- Ensuring appropriate functional areas are represented.
- Ensuring the right type of person is participating in the group.

The practitioner groups should represent the primary systems engineering-related tasks performed within the organization (e.g., analysis, requirements, test). However, it is important to include the support organizations (specifically quality, configuration management, and training) even if these functions are not encompassed structure-wise, in the organization being appraised. It is also recommended that practitioners from specialty disciplines who support systems engineering (e.g., human factors, reliability, manufacturing) be included in the practitioner sample.

The people who are selected to be in the practitioner groups should

- Be opinion leaders who are credible with their peer group.
- Be drawn from areas widespread throughout the organization.
- Be willing to communicate and express their opinions.
- Be able to talk freely and supply useful information.
- Not suppress or intimidate any conversation.

To ensure candid conversation in the practitioner groups, it is typically not recommended to have line management represented. If one of the goals of the appraisal is to assess management issues, the recommendation is to have an entire practitioner group composed of managers.

3.5 Using the Appraisal Questionnaire

Questionnaire distribution

The questionnaire is, at a minimum, distributed to the systems engineering leads or equivalent. However, depending upon the responsibilities and visibility of the systems engineering leads within the organization, the questionnaires for some of the process areas may be distributed to people who are more familiar with the area covered by the process area than the systems engineering lead. Specifically, the organizational process areas should be completed by the appropriate subject matter experts.

Recommended questionnaire recipients

To maximize the accuracy of initial responses to the questions in the SE-CMM questionnaire, it is recommended that the questionnaires be distributed to individuals with the skills and roles expressed in Table 3-2.

Process Area	Primary Recipients	Secondary Recipients
01: Analyze Candidate Solutions	Systems engineering leads for the projects selected for appraisal	Any senior practitioner with significant system design experience
02: Derive and Allocate Requirements	Systems engineering leads for the projects selected for appraisal	
03: Develop Physical Architecture	Systems engineering leads for the projects selected for appraisal	
04: Integrate Disciplines	Systems engineering leads for the projects selected for appraisal	Senior specialty engineers (e.g., reliability, safety, manufacturing, human factors) working on the projects selected for appraisal
05: Integrate System	Systems engineering leads for the projects selected for appraisal	
06: Understand Customer Needs and Expectations	Systems engineering leads for the projects selected for appraisal	<ul style="list-style-type: none"> • Technical marketing personnel • Proposal personnel • Customer service personnel

Table 3-2. Questionnaire Distribution Table.. Questionnaire Distribution .,;{ TC "Table." \ 1 }. Questionnaire Distribution .,; TC "Table." \ 8 }{ TC "Table 3-2. Questionnaire Distribution .c8.Table." \ 1 }, TC "Table 3-2. Questionnaire Distribution ." \ 8 8 ;." \ 8 8 8 ; { TC "Table.\ " \ 8 8 \ 1 8 " }. TC "Table 3-2. Questionnaire Distribution ." \ 8 8 1 ; { TC "Table.\ " \ 8 8 1 \ 8 " }{ TC "Table. TC \ "Table 3-2. Questionnaire Distribution .c8.Table.\ " \ 8 8 \ 1 1 " }

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3.5 Using the Appraisal Questionnaire, Continued

Recommended questionnaire recipients, continued

Process Area	Primary Recipients	Secondary Recipients
07: Verify and Validate System	Systems engineering leads for the projects selected for appraisal	System verification manager or senior test engineers
08: Ensure Quality	Senior project-level quality manager or lead (in environments with shared quality leadership responsibility, systems engineering lead for the project)	<ul style="list-style-type: none"> Systems engineering leads for the projects selected for appraisal Organizational quality manager, total quality management coordinator
09: Manage Configurations	Senior project-level CM manager for the projects selected for appraisal	Systems engineering leads for the projects selected for appraisal
10: Monitor and Control Technical Effort	Systems engineering leads for the projects selected for appraisal	
11: Plan Technical Effort	Systems engineering leads for the projects selected for appraisal	
12: Manage Risk	Systems engineering leads for the projects selected for appraisal	Project or program manager for the projects selected for appraisal
13: Define Organization's Systems Engineering Process	Individuals responsible for defining organization-level processes; may be part of the quality leadership area, policies/procedures area, or other support group	Systems engineering leads for the projects selected for appraisal

Table 3-2. Questionnaire Distribution Table, continued.
 Questionnaire Distribution { TC "Table, continued" \ 1 }.
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 Questionnaire Distribution .c8.Table, continued" \ 8 8 \ 1 1
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3.5 Using the Appraisal Questionnaire, Continued

Recommended questionnaire recipients, continued

Process Area	Primary Recipients	Secondary Recipients
14: Improve Organization's Systems Engineering Processes	Individuals responsible for deploying organization-level process improvement activities; may be part of the quality leadership area, policies/procedures area, or other support group	Systems engineering leads for the projects selected for appraisal
15: Manage Product Line Evolution	Individuals at organization level responsible for strategic product line positioning and advancement; may be in R&D, technical marketing, or other support structure	Systems engineering leads for the projects selected for appraisal
16: Manage Systems Engineering Support Environment	Systems engineering leads for the projects selected for appraisal	Individuals at organization level involved in deploying new development technologies
17: Manage Systems Engineering Training	Individuals responsible for organization-level training planning, development, and deployment; may be part of an R&D group, training department, or other support structure	Systems engineering leads for the projects selected for appraisal

Table 3-2. Questionnaire Distribution Table, continued.
 Questionnaire Distribution { TC "Table, continued" \ 1 }.
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 "Table 3-2. Questionnaire Distribution .c8.Table, continued" \ 1
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 Questionnaire Distribution .c8.Table, continued" \ 8 \ 1 1
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3.5 Using the Appraisal Questionnaire, Continued

Questionnaire administration

The questionnaire must be completed prior to the on-site phase. We recommend that it be administered with a facilitator or site coordinator present and administered to the systems engineering leads and other appropriate personnel as a group, so that common questions can be answered. The typical question regards organizational roles. The person administering the questionnaire should emphasize that the SE-CMM is role independent. The questionnaire only asks if specific tasks are performed on a project, not if they are performed by a specific person.

3.6 Developing the Rating Profile

Introduction

One of the results of the on-site phase is a rating profile covering the appraised process areas. The rating profile correlates closely with the appraisal findings, and the two are developed in a closely coupled process.

The rating profile is developed and refined at specific points in the appraisal process, as detailed in the process element summaries in section 1.4 and in Chapter 2. At the end of the primary data-gathering activities, prior to generating preliminary findings, the team reviews its data tracking sheets (DTSs) to formulate a preliminary rating for each process area. The DTS is a support tool introduced in Appendix C to help organize the data obtained by the appraisal team. Ratings are based on the degree to which the appraised entity performs all of the practices at a given level, in the judgment of the appraisal team. Issues raised in generating preliminary ratings can be addressed during the preliminary feedback sessions. The rating is then refined into a draft rating in conjunction with developing the draft findings. Prior to drafting final findings, the team once again reviews the DTSs to formulate the final rating for each of the process areas.

Diagram of rating profile development process

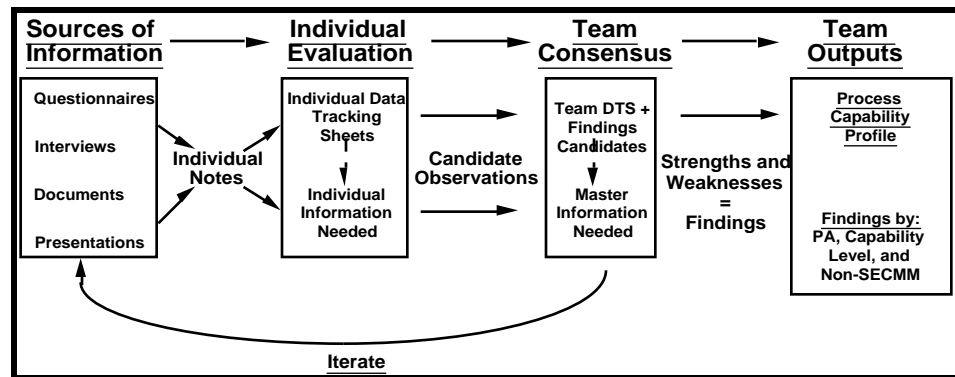


Figure 3-2. Rating Profile Development Process.. Rating Profile Development Process.;. Rating Profile Development Process.;. Rating Profile Development Process.;{ TC "Figure 3-2. Rating Profile Development Process." \1 1 }

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3.6 Developing the Rating Profile, Continued

Data tracking sheet

The DTS is the primary data management tool used by the appraisal team during the on-site phase. The responses to the questionnaires are transcribed onto the DTS at the beginning of the on-site phase. Trends or inconsistencies in data can be identified more easily in the DTS format, which forms the basis for developing the exploratory questions asked of the systems engineering lead. Information obtained from the systems engineering lead and practitioner interviews that supports (corroborating data) or contradicts (opposing data) the premise that the base or generic practice characteristic is exhibited is then recorded on the DTS. All information recorded on the DTS, in addition to the appraisal team's notes from interviews and reviews of supporting material, is used to develop the rating profile.

The DTS format also facilitates identifying where no additional supporting data have been obtained. This permits directing further interviews, particularly the practitioner interviews, to fill in any information gaps. Conscientious data management throughout the on-site phase significantly improves the efficiency of the whole appraisal process and facilitates the rating development.

Data Tracking Algorithm

The data tracking algorithm is used iteratively throughout the on-site week to assist the appraisal team in estimating the organizational maturity level for each Process Area. The estimate is likely to change over the course of the on-site week. The ratings are described as minimum percentages for the Base and Generic Practices, as shown in Table 3-3 below. These percentages refer to the number of “yes” responses out the total number of “yes” and “no” responses provided by the SE Leads.

No ratings estimates are shown outside of the appraisal team until the Final Briefing of the on-site week.

The initial calculation of the algorithm, known as the Questionnaire Rating, yields a reading of the organization’s maturity rating based on the answers to the questionnaire. The next calculation of the algorithm, known as the Preliminary Rating, is based on aggregated data from the questionnaires plus the SE Lead and Practitioner interviews. It commonly differs from the Questionnaire Rating. The next calculation, known as the Draft Rating, is based on more data from SE Leads. Similarly, it commonly differs from the Preliminary Rating. The final calculation of the algorithm is based on further data from Practitioners and SE Leads, and is known as the Final Rating. The Final Rating rarely differs from the Draft Rating, and is the only rating shown outside the appraisal team.

Considerations in Calculating the Algorithm

In calculating the algorithm, the appraisal team is to consider the number of “yes” responses out the total number of “yes” and “no” responses provided by the SE Leads. Consider, for example, calculating the Questionnaire Rating from responses to the six Base Practices of the Analyze Candidate Solutions PA. If three SE Leads complete the questionnaire, providing 16 “yes” answers out of a total of 18 possible responses, then the algorithm would indicate that level 1 might be achieved. Legitimate “N/A” responses, which would be rare, are not counted in the total of possible responses.

In order for a Process Area to be considered at a particular level, the percentage of “yes” answers must satisfy the percentages shown in Table 3-3. For example, for the appraisal team to judge the organization at level 2 in a particular Process Area, all (100%) of the Base Practices **and** 90% of the Level 2 Generic Practices must be answered with a “yes.”

In calculating the Preliminary Rating, the data from SE Lead and Practitioner interviews will often change the count of “yes” and “N/A” responses. That is, the Preliminary Rating will often differ from the Questionnaire Rating.

	Level 1	Level 2	Level 3	Level 4	Level 5
Base Practices	90%	100%	100%	100%	100%
GP 2.XX	-	90%	100%	100%	100%
GP 3.XX	-	-	90%	100%	100%
GP 4.XX	-	-	-	100%	100%
GP 5.XX	-	-	-	-	100%

Table 3-3 Rating Table; Table 3-3 Rating Table

Ratings Responses

In general, persons responding to the questionnaire should be encouraged to provide “yes” or “no” answers. In cases where this proves to be difficult, respondents should include explanatory comments on the questionnaire. However, there remain cases where “not applicable” (N/A) or “don’t know” are the only appropriate answers. Such responses are opportunities for the appraisal team to clarify through the use of Exploratory Questions. Each of the possible responses is discussed below.

Response	Comments
Yes	Represents conformity to the Base or Generic Practice. Although the SE Lead generates the response, the appraisal team must ultimately judge the response in the light of subsequent appraisal interviews.

No	Treat legitimate old project no's as n/a's. For example, an old project that didn't follow the requirements allocation process because it did not exist when the project started should not be penalized with a "no." Instead allow the SE Lead to answer "n/a" to such questions.
N/A	The appraisal team (not the SE lead) must be the judge of whether an n/a is legitimate. Similarly, the appraisal team must be the judge of when a legacy project can legitimately claim its waiver of a practice.
Don't Know	" <i>Don't know's</i> " should be examined by the appraisal team. Some of them are legitimate; e.g., SE Lead may not know about the allocation of resources to the organization's training program. Or, if questionnaire is given to a functional lead, like CM or QA, then they may not be expected to know detailed information about categories other than their own. These cases should be treated like <i>N/A's</i> . But, in general, answers to project, engineering, and most organizational questions should be known by the SE Leads. For these cases, <i>don't know's</i> represent a lack of adequate institutionalization, and should be treated as <i>no's</i> .

3.6 Developing the Rating Profile, Continued

DTS Figure{ TC "Figure" \l 1 } The following is a condensed version of the data tracking sheet found in Appendix C.

		Questionnaires							Initial
		A	B	C	D	E	F	G	Projected Rating
PA 01: Analyze Candidate Solutions									
Base Practices:									
1.1	Establish Evaluation Criteria								
1.2	Define Approach								
1.3	Identify Additional Alternatives								
1.4	Analyze Candidate Solutions								
1.5	Select Solutions								
1.6	Capture Results								
Generic Practices:									
2.1.1	Allocate Resources								
2.1.2	Assign Responsibilities								
2.1.3	Document Approach								
2.1.4	Provide Tools								
2.1.5	Ensure Training								
2.1.6	Plan Performance								
2.2.1	Follow Plans								
2.2.2	Do Configuration Management								
2.3.1	Verify Process Compliance								
2.3.2	Audit Work Products								
2.4.1	Track with Measurement								
2.4.2	Take Corrective Action								
3.1.1	Standardize Process								
3.1.2	Tailor Standard Process								
3.2.1	Follow Defined Process								
3.2.2	Perform Peer Reviews								
3.2.3	Use Process Data								
4.1.1	Establish Quality Goals								
4.2.1	Determine Process Capability								
4.2.2	Use Process Capability								
5.1.1	Establish Process Goals								
5.1.2	Improve Defined Process								
5.2.1	Do Causal Analysis								
5.2.2	Eliminate Defect Causes								

Figure 3-3. Condensed Data Tracking Sheet.. Condensed Data Tracking Sheet.;. Condensed Data Tracking Sheet.;. Condensed Data Tracking Sheet.;{ TC "Figure 3-3. Condensed Data Tracking Sheet." \l 1 }

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3.6 Developing the Rating Profile, Continued

DTS Figure,
continued{ TC
"Figure,
continued" \l 1 }

			Interviews						Prelim
			A	B	C	D	Gp 1	Gp 2	Gp 3
PA 01: Analyze Candidate Solutions									
Base Practices:									
1.1	Establish Evaluation Criteria								
1.2	Define Approach								
1.3	Identify Additional Alternatives								
1.4	Analyze Candidate Solutions								
1.5	Select Solutions								
1.6	Capture Results								
Generic Practices:			<same as above>						

			Findings Review						Final
			A	B	C	D	Oth	Oth	Oth
PA 01: Analyze Candidate Solutions									
Base Practices:									
1.1	Establish Evaluation Criteria								
1.2	Define Approach								
1.3	Identify Additional Alternatives								
1.4	Analyze Candidate Solutions								
1.5	Select Solutions								
1.6	Capture Results								
Generic Practices:			<same as above>						

Figure 3-3. Condensed Data Tracking Sheet, continued.
Condensed Data Tracking Sheet, continued;. Condensed Data Tracking Sheet, continued;. Condensed Data Tracking Sheet, continued;{ TC "Figure 3-3. Condensed Data Tracking Sheet, continued" \l 1 }

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3.6 Developing the Rating Profile, Continued

Preliminary ratings

No attempt should be made to develop a preliminary rating until all of the primary data have been collected (all initial systems engineering leads and practitioners have been interviewed, and supporting material has been reviewed). Preliminary ratings are developed at the same time as the preliminary findings, typically during the afternoon of the third on-site appraisal day. The advantage of developing preliminary ratings at this time is that the need for additional information may be brought up while developing the ratings. There is a further opportunity to get additional information during review sessions of the preliminary findings with the systems engineering leads.

Preliminary ratings are a synthesis of all of the primary data collected. The appraisal team must determine if the base or generic practice is performed based upon the data shown on the DTS. Conflicting data must be resolved by appraisal team consensus.

Draft and final ratings

The final ratings are developed prior to developing the final findings. They serve as a starting point for developing the final findings. There is generally a close correlation between the final findings and the process areas with a low rating profile.

Information from the review sessions of the preliminary and final findings is used to adjust the ratings as needed.

Using rating data

The rating algorithm for determining a capability level in a process area is the appraised entity performing 100% of the base or generic practices in the respective level. In addition, a higher level can be achieved only if a lower level is also fulfilled.

Performance of 100% of the base or generic practices is estimated for the appraised entity as a whole only at the preliminary, draft, and final ratings steps. As explained in further detail in the DTS Summary in Appendix C, preliminary, draft, and final findings and the rating profile represent a summary of all of the data collected over the appraisal on-site period.

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3.6 Developing the Rating Profile, Continued

Possible rating presentation formats

The following formats for presenting the rating profile have all been used in different appraisal contexts.

- Pie chart: number of PAs at specific levels (works well for organization primarily in the level 2-3 maturity range).
- Bar chart: score for each PA shown on a bar graph that allows the option to use quartiles for PAs below level 1 (good option for the organization in the 0-2 maturity range).
- Tabular format.

Example pie chart

Profile-Pie Chart

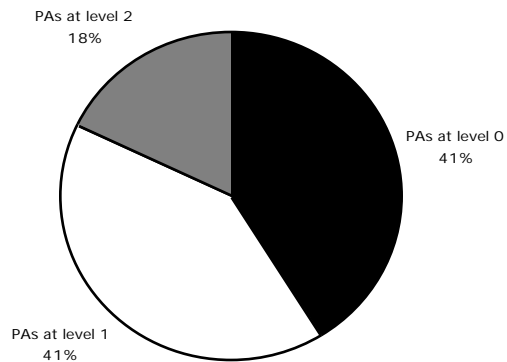


Figure 3-4. Pie Chart Example.. Pie Chart Example.;. Pie Chart Example.;. Pie Chart Example.;

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3.6 Developing the Rating Profile, Continued

Example bar chart

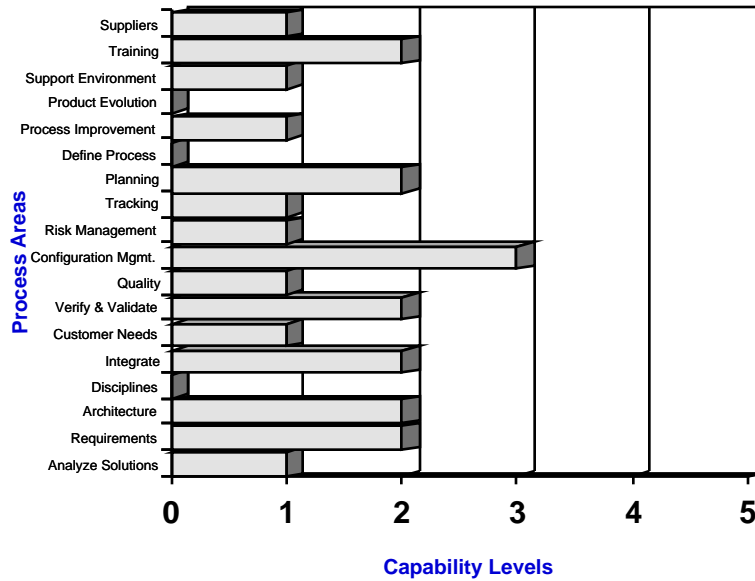


Figure 3-5. Bar Chart Example.. Bar Chart Example.; Bar Chart Example.; Bar Chart Example.;

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3.6 Developing the Rating Profile, Continued

Example tabular format

PA Title	Rating
Analyze Candidate Solutions	1
Develop Functional/Performance Requirements	2
Develop Physical Architecture	2
Integrate Disciplines	0
Integrate System	2
Understand Customer Needs & Expectations	1
Verify & Validate System	2
Ensure Quality	1
Manage Configurations	3
Manage Risk	1
Monitor & Control Technical Effort	1
Plan Technical Effort	2
Define Organization's Systems Engineering Process	0
Improve Organization's Systems Engineering Processes	1
Manage Product Line Evolution	0
Manage Systems Engineering Support Environment	1
Manage Systems Engineering Training	2
Coordinate with Suppliers	1

Table 3-4. Tabular Format Example.. Tabular Format Example.;
Tabular Format Example.; Tabular Format Example.:{ TC "Table
 3-4. Tabular Format Example." \ 1 }

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3.7 Developing Findings

Introduction

The appraisal findings are a key product of the appraisal. They are the result of synthesizing all of the data collected throughout the on-site phase, along with the questionnaire responses. Findings are limited to approximately seven, so that the organization is left with a number of findings that is manageable in forming or continuing an improvement effort.

Exploratory questions

Exploratory questions are developed to explore the reason for any inconsistencies in the questionnaire responses, and are the first step in eliciting supporting or conflicting information on the performance of base or generic practices. Exploratory questions

- Should be limited to approximately 50 per systems engineering lead, and should be prioritized due to interview time limitations.
- Should be linked to the individual process areas in order to maintain traceability to the model, and facilitate the data management that needs to occur throughout the on-site phase.
- Are typically a mix of some specific questions that are designed to address inconsistencies on a specific project, or general questions aimed at possible consistent misinterpretations of the questionnaire.

Information on the performance of base or generic practices is recorded on the DTS after each of the interviews with the systems engineering lead.

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3.7 Developing Findings, Continued

Preliminary findings

The preliminary findings are a synthesis of the primary issues that appraisal team members have collected from both the systems engineering leads and the practitioner groups. Preliminary findings include both strengths and weaknesses.

The preliminary findings are reviewed with the systems engineering leads to confirm that the findings are true for their project, and that the findings are true for the organization based upon their knowledge. The primary objective of this set of sessions is to validate the synthesized comments.

Feedback from the systems engineering leads also helps in the prioritization of the data. The number of times that a preliminary finding is supported or contradicted helps the appraisal team determine high-priority items in the next synthesis step to develop the draft findings.

An additional objective of the feedback sessions is to obtain more supporting or conflicting information that is used to establish the rating. Additional questions may be inserted to address uncertainties that the appraisal team may have with respect to the rating profile.

Process for developing draft findings

The draft findings are the unreviewed version of the final findings. Confirmed preliminary findings are clustered using a technique such as affinity diagram, and a set of 5 to 10 themes or underlying factors are derived to form the draft findings. Draft findings are presented via briefing charts in the format of finding, cause, and consequence.

The draft and final findings typically fall into one of three categories:

- General barriers to the next level.
- Weaknesses in the base practices.
- Weaknesses in the generic practices.

The draft findings are presented to the systems engineering leads and practitioners to get validation of the draft findings, to give the appraisal team leader a chance to dry-run the presentations, and to allow a forum for the practitioners to refine the findings.

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3.7 Developing Findings, Continued

Finding, cause, consequence

Once a set of findings areas is identified, the team should brainstorm the findings, causes, and consequences. The main findings should be carefully worded to reflect what the team has actually heard from the participants. The finding is usually a single observation; it may be thought of as a characterization of a symptom. An example of a finding is

System engineering plans do not realistically reflect the needs of the projects.

Causes are observations that support the central finding, and many indicate potential causes of the finding. An example of a cause is

Estimates are not based on available historical data.

Consequences list the probable results of the finding. An example of a consequence is

Cost & schedule overruns

The causes and consequences are often taken directly from the preliminary findings. The causes are an opportunity to employ the phrasing heard during the practitioner's sessions. On the other hand, consequences primarily target the sponsor and should reflect his/her perspective. Use of organizational objectives or goals and the risks to meeting those goals is recommended as part of the consequences.

During this initial step do not get bogged down. If the team cannot agree on wording, leave it for the next step. At the end of this step, the findings have been identified along with a set of causes and consequences.

Final findings

Final findings are an edited version of the draft findings based upon comments from the practitioners and systems engineering leads. These are used to develop the appraisal report and recommendations.

A sample final findings briefing is included in Appendix B for reference.
