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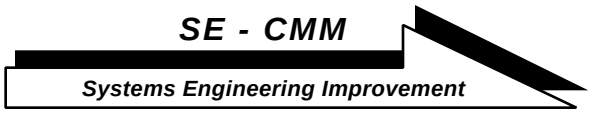
Carnegie Mellon University
Software Engineering Institute

A Description of the Systems Engineering Capability Maturity Model Appraisal Method Version 1.0



Systems Engineering
Capability Maturity Model Project

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Handbook

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FOR THE COMMANDER

(signature on file)

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To the Reader

Abstract

The purpose of this document is to summarize the major elements of the Systems Engineering Capability Maturity Model (SE-CMM) 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-94-HB-04 [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 who 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 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.

continued on next page

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 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

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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Software Productivity Consortium	Art Pyster, PhD
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European Software Institute	Colin Tully, PhD

SE-CMM Collaboration Contacts

continued on next page

Additional information-project office

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Data rights associated with the SE-CMM

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

1.1 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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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

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. A typical schedule and labor template is 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	120
Appraisal team member (in addition to facilitators)	4-6	50	200-300
Systems engineering leads	1 per project (3 projects)	6	18
Practitioners from across organization	30 (3 groups of 10)	4	120
TOTAL			458-568

Table 1-1. Labor Requirements for an Appraisal.

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.

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Diagram of Preparation Phase

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

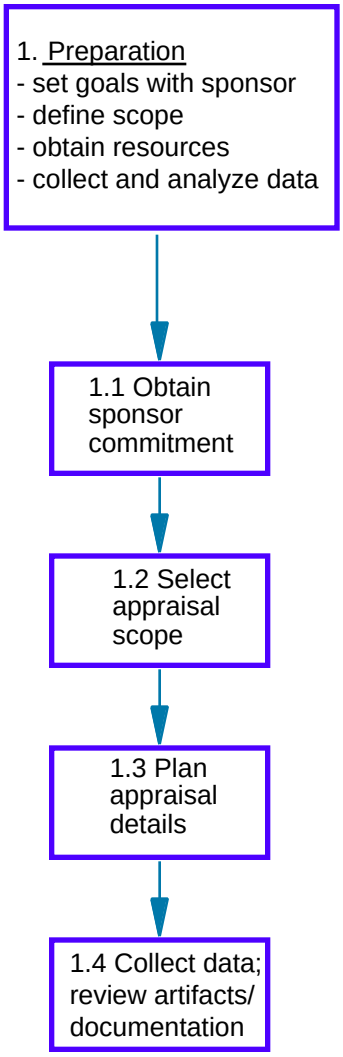

Figure 1-1. Diagram of Preparation Phase.

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Diagram of on-site Phase

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

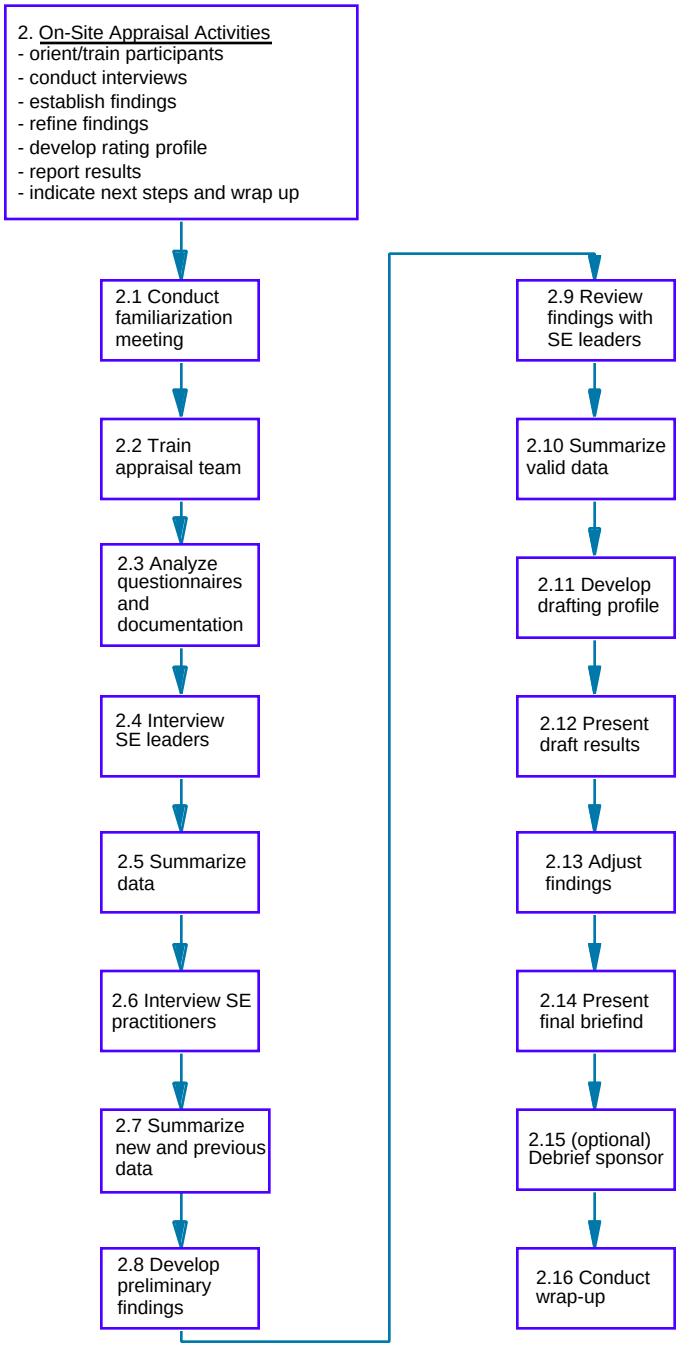

Figure 1-2. Diagram of On-Site Phase.

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Diagram of Post-Appraisal Phase

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

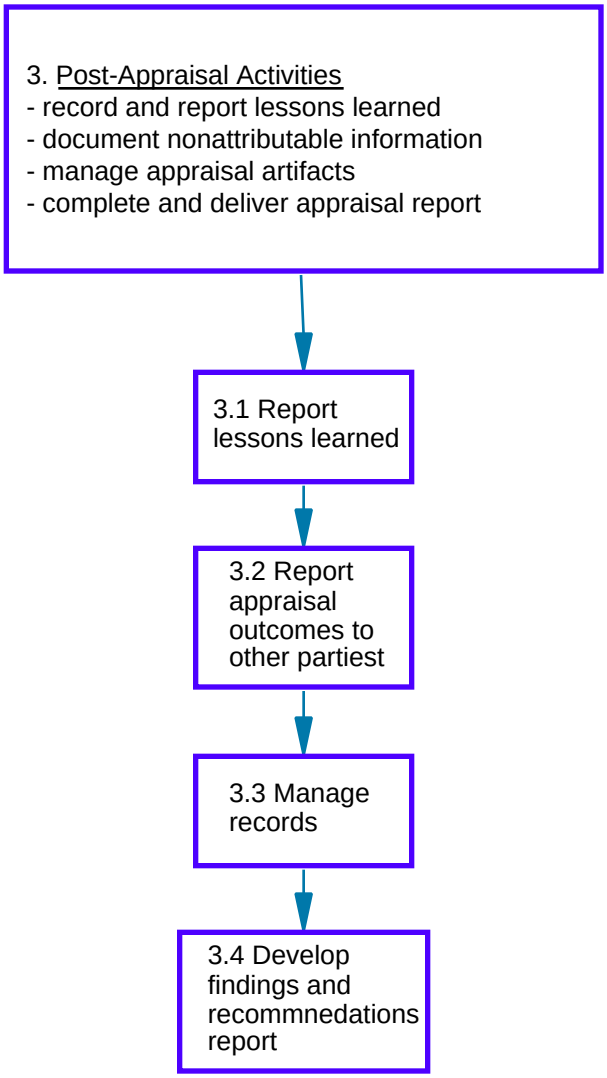

Figure 1-3. Diagram of Post-Appraisal Phase.

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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 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 Consolidate Data 2.13 Adjust Draft Findings	Consolidate Data
2.5 Consolidate Data from SE Leads 2.7 Consolidate Data from Practitioners 2.10 Consolidate Data	Review/Revise Data Gathering Plans
2.11 Develop Draft Findings	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 Report Appraisal Output to Other Parties 3.3 Manage Appraisal Records	Report results

Table 1-3. Relationship of SAM & IPI Activities.

1.2 Assumptions

Introduction

This section discusses the underlying assumptions, both procedural and model-based, that are relevant to using SAM.

Assumptions

The SAM description is based on the following assumptions:

- 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, *A Systems Engineering Capability Maturity Model, Version 1.0.*
- 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 *A Systems Engineering Capability Maturity Model, Version 1.0* [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	The appraisal team consists of those who conduct the appraisal. *All of the personnel on the appraisal team should be familiar with the SE-CMM prior to the on-site phase.* This group includes the following roles: • Facilitator. • Appraisal team leader. • Site coordinator. • Appraisers drawn from the entity being appraised (internal) or customer (supplier selection). The term appraisal team members indicates any of the roles cited above
Facilitator	Member of the appraisal team who is responsible for • Familiarizing the appraisal team with SAM. • Facilitating the appraisal process during the on-site phase. • Providing SE-CMM expertise. The facilitator is often drawn from outside the sponsoring organization.
Appraisal team leader	Individual who is responsible for • Presenting the appraisal findings and developing the appraisal report.
Site coordinator	Individual who is responsible for • Obtaining facilities for the on-site phase. • Scheduling activities during the on-site week. • Administering and collecting questionnaires. • Ensuring personnel attendance, as appropriate.
Appraiser	An appraisal team member who participates in the data collection, analysis, findings generation, and communication with the participants from the organization (appraised entity).

Table 1-4. Appraisal Roles.

continued on next page

Personnel and associated roles (continued)

Role Name	Description
Appraisal participants	The appraisal participants are the subjects of data gathering in an appraisal. This group includes • Project lead systems engineers (or equivalent). • Practitioners (both technical and management). • Support personnel. Participants are the primary sources of data via questionnaires and interviews. Guidance on participant selection is found in Chapter 2.
Project lead systems engineers (or equivalent)	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 • 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	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.
Appraisal support personnel	Personnel who support the appraisal process. Examples include secretaries and logistics coordinators for the appraisal.
Appraisal customer	Individual or group who defines the objectives, receives the results, and covers the cost of the appraisal. This group includes • Sponsor • Management

Table 1-4. Appraisal Roles, continued

continued on next page

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

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
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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

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.

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

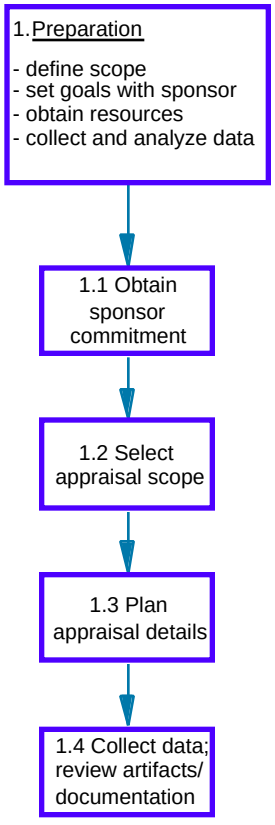

Figure 2-1. Diagram of Preparation Phase.

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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 • 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	• 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)	• 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	• Approved appraisal plan
2.1.4	Collect data	Administer questionnaire and review any appropriate documents/artifacts	• Responses to questionnaire • Document/artifact review notes

Table 2-2. Summary Description of Preparation Phase.

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.

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 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 the sponsor understands his/her role in the appraisal. Chapter 3 contains additional guidance on establishing appraisal goals.

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.

continued on next page

2.1.1 Obtain Sponsor Commitment, Continued

Typical duration	Two hours to several weeks
Tailorable parameters	• 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	• Appraisal goals established. • Sponsor commitment to provide appraisal resources obtained. • Sponsor commitment to appropriate behavior during the appraisal obtained.
Notes	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. Guidance on using business goals and organization context for tailoring the appraisal is addressed in Chapter 3.

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.

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.

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 address 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.

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.

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.

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.

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 as a group, with the facilitator or other person with knowledge about the SE-CMM present to answer questions of terminology, etc.
Appraisal team	Determines recipients of the questionnaires and oversees administration of them.
Appraisal team leader	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.

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2.1.4 Collect Questionnaire Data, Continued

Typical duration	One to two hours per participant
Tailorable parameters	• 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	• 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 the appendix 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.

continued on next page

Diagram

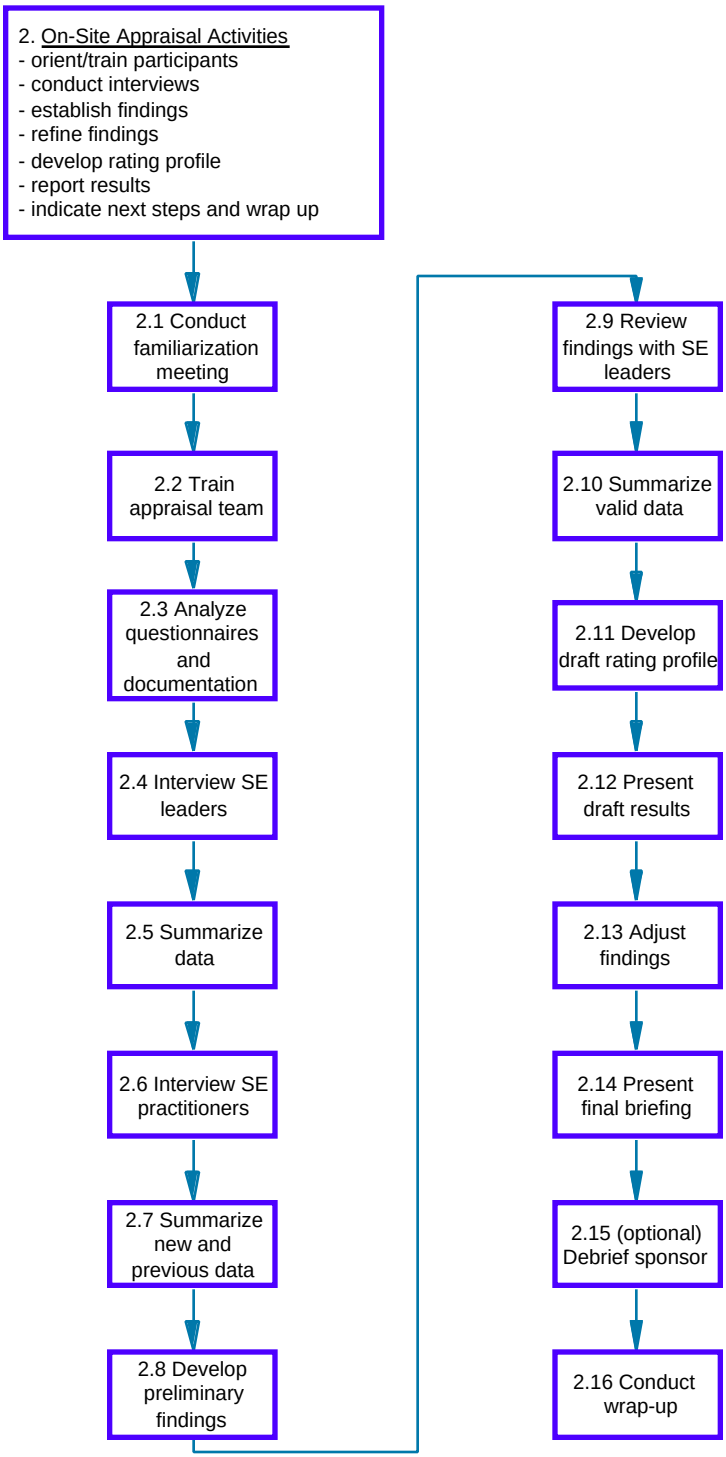

Figure 2-2. Diagram of On-Site Phase.

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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.	• 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.	• Prepared team
2.2.3	Analyze question-naire	The appraisal team analyzes the responses to the questionnaire and formulates a set of follow-on, exploratory questions for the systems engineering leads.	• 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.	• 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).	• Updated DTS • Adjustments to practitioner interviews

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

continued on next page

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.	• 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.	• 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.	• 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.	• 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.	• Updated DTS • Draft ratings
2.2.11	Develop draft findings	The team prioritizes and provides wording for findings that fit the appraisal context.	• Prioritized draft findings

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

continued on next page

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.	• 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.	• 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.	• 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.	• 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.	• Follow-on plans • SE-CMM feedback

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

continued on next page

Typical duration

Five calendar days

Tailorable parameters

- Number of interviews.
- 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.

Notes

The following diagram provides an overview of a typical five-day on-site appraisal period. This example assumes four projects and three practitioner groups.

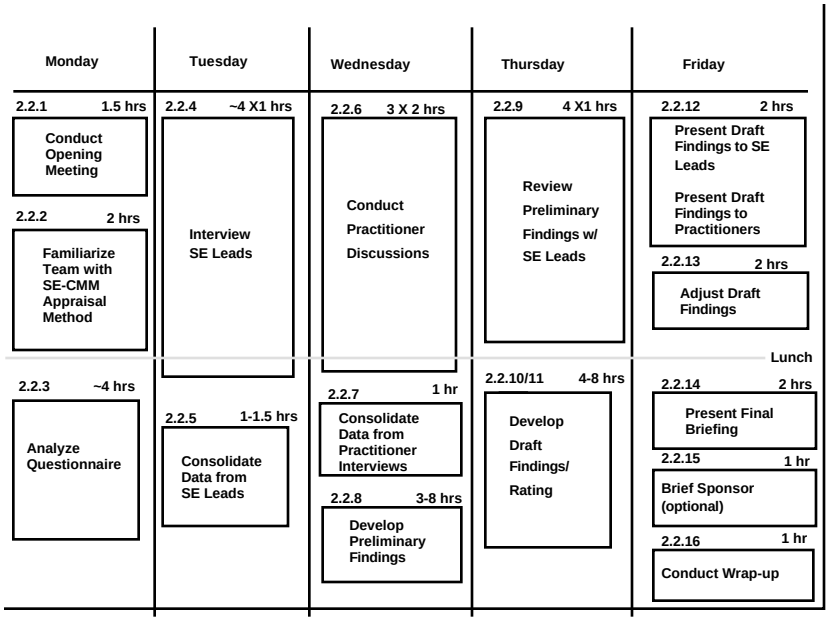

Figure 2-3. Typical On-Site Appraisal Schedule.

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.

Typical duration 1.5 hours

continued on next page

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.

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.

Typical duration

Two hours

continued on next page

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.

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.

Typical duration Four hours

continued on next page

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	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 then 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" which 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. 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.

Table 2-14. Steps for Analyze Questionnaire.

continued on next page

Steps, continued

Step	Guidance
Generate questions, continued	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: • 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 make a list of any requested documentation.
Appraisal team	Takes notes of responses and occasionally ask for additional clarification.
Systems engineering lead	Responds to questions.

Table 2-15. Participants for Interview Systems Engineering Leads.

continued on next page

Typical duration One hour per session + 15 minutes for team discussion per project

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.

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

Exit criteria
- As many questions as possible from interview script are covered.

continued on next page

Notes

The reason interview scripts 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 ensuring from EQs as they are happening. If the EQs have been prepared on line, and responses are recorded in spaces between, this permits much more rapid consolidation 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	Review their notes, discuss any issues, formulate observations, and update their data tracking sheets

Table 2-17. Participants for Consolidate Data from SE Leads.

Typical duration One to 1.5 hours

continued on next page

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.

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.

Typical duration

Six hours (3 hours and 45 minutes, with 15 minute breaks)

continued on next page

Steps

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

Step	Guidance
Preparation	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.
Introduction	The session facilitator • 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. 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.

Table 2-20. Steps for Interview Practitioners.

continued on next page

Steps, continued

Step	Guidance
Discussion	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?"). 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 loose 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?").

Table 2-20. Steps for Interview Practitioners, continued

continued on next page

Steps, continued

Step	Guidance
Closing	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. The session facilitator then asks each practitioner the following question: *If you could change one thing in your organization other than your boss or your paycheck, what would it be?* Next, the facilitator asks each practitioner (perhaps going around the group in the opposite direction): *Other than the people, what do you think is this organization's major strength?* Note the word "organization" should be customized for the situation. Finally, the session facilitator thanks the practitioners for their participation and reminds them of the time and location for presenting the draft findings.
Process check	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.

Table 2-20. Steps for Interview Practitioners, continued

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.

continued on next page

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 manger 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.

Typical duration

One to two hours

continued on next page

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	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, 100% of the base practices, across the appraisal entity as a whole, must be performed. For levels two 2 through 5, 50% of the generic practices associated with that level must be performed across the organization. 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.
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.

continued on next page

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.

continued on next page

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.

Typical duration

Four or more 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.

Typical duration One hour per project

continued on next page

Steps

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

Step	Guidance
Introduction	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. 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.
Review findings	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. The facilitator or members of the team can ask for clarification or a follow-on question. However, *all* 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.

Table 2-26. Steps for Review Preliminary Findings.

continued on next page

Steps, continued

Step	Guidance
Closing	The session facilitator closes the session by asking the systems engineering lead the following question: *If you could change one thing in your organization other than your boss or your paycheck, what would it be?* Next the facilitator asks: *Other than the people, what do you think is this organization's major strength?* Note the word "organization" should be customized for the situation. 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.
Process check	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 still leave time to be back in the room before the next lead arrives.

Table 2-26. Steps for Review Preliminary Findings, continued

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 which 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.

Typical duration

One to two hours

continued on next page

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	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). 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.
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.

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

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.

Typical duration

Four or more hours

continued on next page

Steps

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

Step	Guidance
Review data	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. 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. Initially the team may identify more than nine areas, with the understanding that it will merge or drop some later.
Prioritize findings	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.
Wordsmith	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. 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.

Table 2-30. Steps for Develop Draft Findings.

continued on next page

Steps, continued

Step	Guidance
Form consensus	Finally, each finding is presented to the group for final edit and approval. The team *must* 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. 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.
Prepare slides	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.

Table 2-30. Steps for Develop Draft Findings, continued

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 *not* 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.

Typical duration

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

continued on next page

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. This briefing should not include the introductory material or rating profile to allow extra time for feedback. 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, 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, just to make 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.

continued on next page

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

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, just to show the team's willingness to listen, even if they are minor details.

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.

continued on next page

Typical duration

Two hours (Usually an additional hour is provided for lunch, and any last minute cleanup/production can be handled during that time frame if necessary.)

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.

continued on next page

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

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.

Typical duration One to two hours

continued on next page

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.

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

This is where the participants are likely to test the sponsor's commitment to use the results of the appraisal.

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.

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.

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.

Typical duration One hour

continued on next page

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 appraisal report sections 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.

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

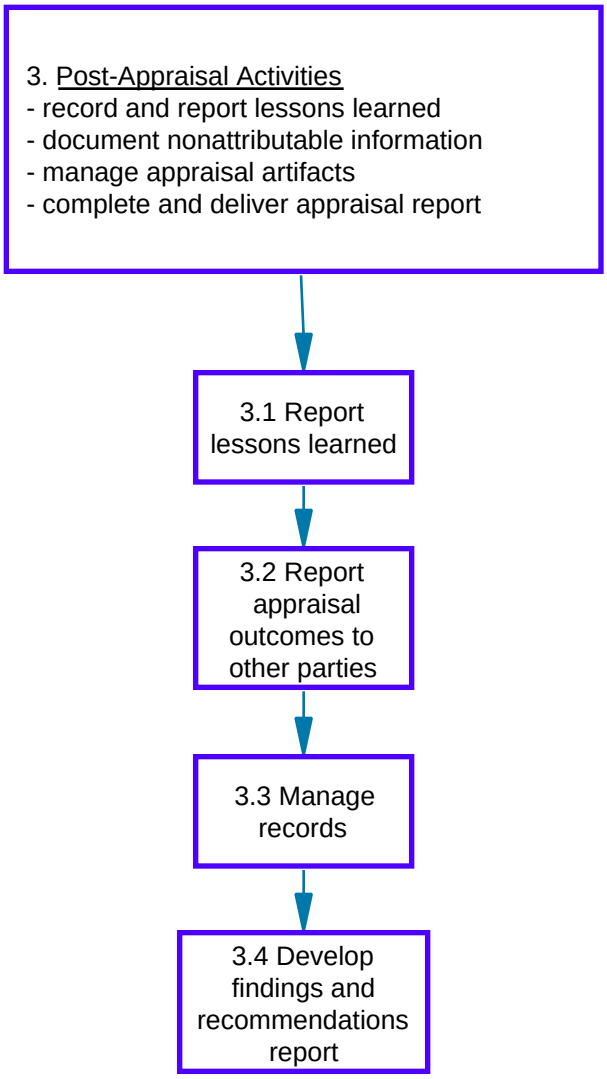

Figure 2-4. Diagram of Post-Appraisal Phase.

continued on next page

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.

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.

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 Report Appraisal Output to Other Parties

Element title/tag

2.3.2 Report Appraisal Output to Other Parties (RP)

Purpose

The purpose of Report Appraisal Output to Other Parties is to make previously agreed-upon data from the appraisal available to appropriate parties (e.g., the SE-CMM maintainers) for inclusion in state-of-the-practice or other appropriate publications.

Summary description

Report Appraisal Output to Other Parties involves sanitizing the appraisal data in preparation for making previously agreed-upon data from the appraisal available to appropriate parties (e.g., the SE-CMM maintainers) for inclusion in state-of-the-practice or other appropriate publications.

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
Appraisal team	Sanitizes data and provides it to agreed-upon parties.

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

Typical duration

Two to four hours

Tailorable parameters

- Level of detail provided.

Notes

The data to be provided are negotiated during the preparation phase.

2.3.3 Manage Records

Element title/tag

3.3 Manage Records (MR)

Purpose

The purpose of Manage Records is to verify that all records of the appraisal, both intermediate and final, are disposed of in accordance with agreed-upon appraisal ground rules.

Summary description

Manage Records involves reviewing all the gathered appraisal materials and ensuring their proper disposal. Most intermediate notes and work products are appropriately destroyed once the findings and recommendations report is complete. Notes may be kept until then to provide context for recommendations and to verify the accuracy of the report.

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
Appraisal team	Gathers notes and other records and appropriately disposes of them.
Appraisal team leader	Secures all records that are being kept.

Table 2-44. Participants for Manage Records.

Typical duration

One to two hours

Tailorable parameters

- What records are kept.
- How records are secured.

Exit criteria

- Records being kept are secured.
- Records not needed are destroyed.

Notes

For the records being kept, the security provided should be equivalent to that for salary records or personnel actions. It is important that the integrity of the team be maintained; violation of the stated confidentiality rules, even after the fact, can damage future appraisal activities.

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 entire week. 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 Using the Appraisal Questionnaire	3-11
3.6 Developing the Rating Profile	3-15
3.7 Developing Findings	3-24

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.

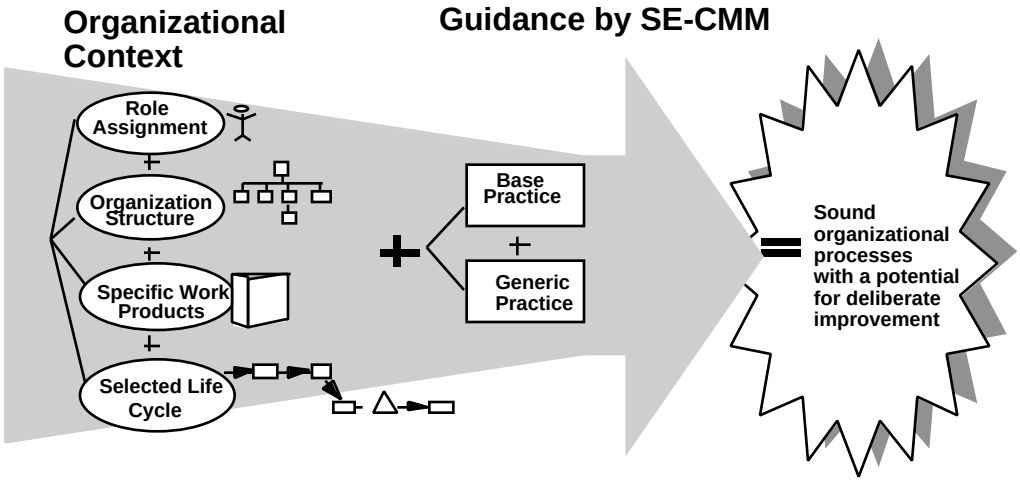

Figure 3-1. Key Influences of Organizational Improvement.

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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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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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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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 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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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	• Technical marketing personnel • Proposal personnel • Customer service personnel

Table 3-2. Questionnaire Distribution Table.

continued on next page

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)	• 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

continued on next page

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

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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 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

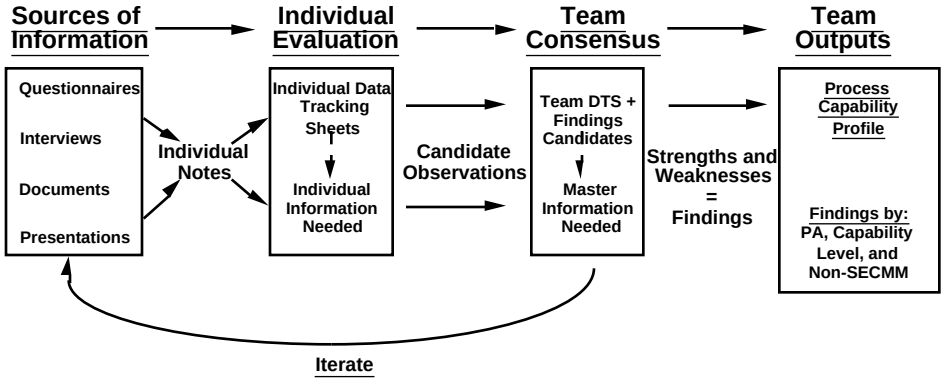

Figure 3-2. Rating Profile Development Process.

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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 exploratory questions for 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 is used to develop the rating profile, in addition to the appraisal team's notes from interviews and reviews of supporting material.

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.

continued on next page

DTS Figure

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								
	5.2.3	Improve Standard Process								

Figure 3-3. Condensed Data Tracking Sheet.

continued on next page

DTS Figure, continued

			Interviews							Prelim
			A	B	C	D	Gp 1	Gp 2	Gp 3	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:		<same as above>							

			Findings Review							Final
			A	B	C	D	Oth	Oth	Oth	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:		<same as above>							

Figure 3-3. Condensed Data Tracking Sheet, continued

continued on next page

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 lead 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, 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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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 which allows the option to use quartiles for PAs below level 1 (good option for the organization in the 0-2 maturity range).
- Tabular format.

Other possible presentation formats include the Kiviat diagram (also called a radar chart or bull's eye chart).

Example pie chart

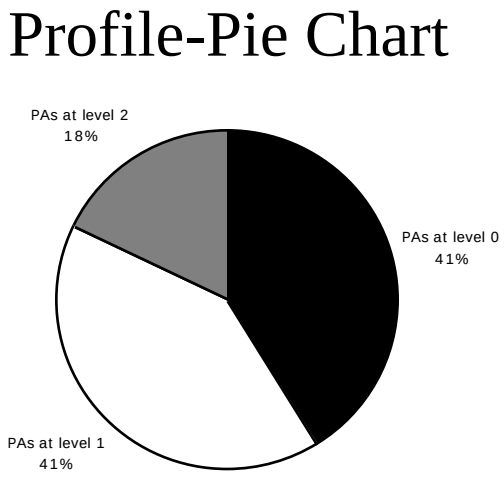

Figure 3-4. Pie Chart Example.

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Example bar chart

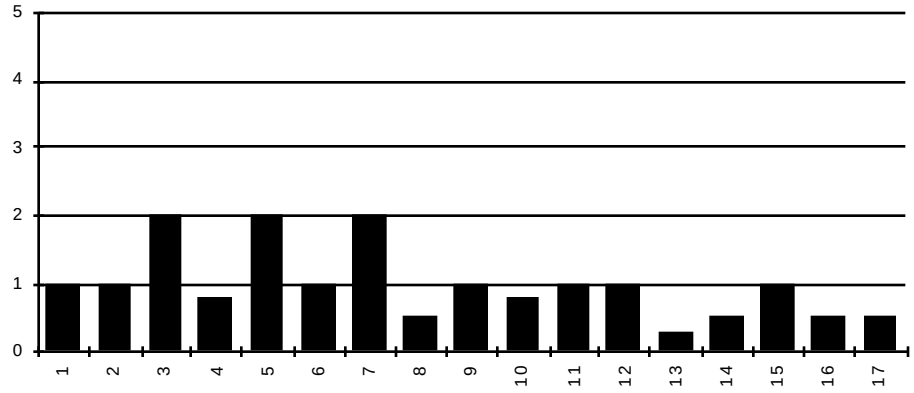

Figure 3-5. Bar Chart Example.

continued on next page

Example tabular format

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

Table 3-3. Tabular Format Example.

continued on next page

Example Kiviat diagram

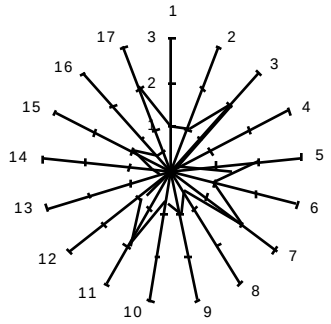

Figure 3-6. Kiviat Diagram Example.

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.

continued on next page

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 if the findings are true for the organization based upon their knowledge. The primary objective of this set of sessions 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 which forms 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, give the appraisal team leader a chance to dry-run the presentations, and allow a forum for the practitioners to refine the findings.

continued on next page

Finding, cause, consequence

Once a set of findings areas are 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.

PA 01: Analyze Candidate Solutions

Process area summary

The purpose of Analyze Candidate Solutions is to perform studies and analyses that result in the selection of a solution to meet the specified constraints of the situation that generated the need for analysis. Analyze Candidate Solutions involves defining the approach and evaluation criteria for the analysis, as well as for choosing, selecting, and studying the candidate solutions. Communication of the rationale and results of the analysis must also be accomplished.

1. Base practices

Comments:

The following list contains base practices that are essential elements of good systems engineering:

Yes No N/A

[ ] [ ] [ ] Establish evaluation criteria based on the identified problem and its defined constraints.

[ ] [ ] [ ] Define the general approach for the analysis, based on the established evaluation criteria.

[ ] [ ] [ ] Identify alternatives for evaluation in addition to those provided with the problem statement.

[ ] [ ] [ ] Analyze the competing candidate solutions against the established evaluation criteria.

[ ] [ ] [ ] Select the solution that satisfies the established evaluation criteria.

[ ] [ ] [ ] Capture the disposition of each alternative under consideration and the rationale for the disposition.

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

continued on next page

4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 01: Analyze Candidate Solutions

PA 02: Derive and Allocate Requirements

Process area summary

The purpose of the Derive and Allocate Requirements is to analyze the system and other requirements and derive a more detailed and precise set of requirements. These derived requirements are allocated to system functions, people, and supporting processes, products, and services, which can be used to synthesize solutions. This process area addresses both the analysis of system-level requirements and the allocation of system-level or derived requirements to lower level functions. This analysis involves addressing the concept of operations, functional partitioning, and performance allocation, as well as capturing the status and traceability of requirements.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes	No	N/A	
[ ]	[ ]	[ ]	Develop a detailed operational concept of the interaction of the system, the user, and the environment, that satisfies the operational need.
[ ]	[ ]	[ ]	Identify key requirements that have a strong influence on cost, schedule, functionality, or performance.
[ ]	[ ]	[ ]	Partition requirements into groups of requirements based on established criteria, such as similar functionality, performance, or coupling, to facilitate and focus the requirements analysis.
[ ]	[ ]	[ ]	Derive, from the system and other (e.g., environmental) requirements, requirements that may be logically inferred and implied as essential to system effectiveness.
[ ]	[ ]	[ ]	Identify the requirements associated with external interfaces to the system and interfaces between functional partitions.
[ ]	[ ]	[ ]	Allocate requirements to functional partitions, system elements, people, and support elements to support synthesis of solutions.
[ ]	[ ]	[ ]	Analyze requirements to ensure that they are verifiable by the methods available to the development effort.
[ ]	[ ]	[ ]	Maintain requirements traceability to ensure that lower level (derived) requirements are necessary and sufficient to meet the objectives of higher level requirements.
[ ]	[ ]	[ ]	Capture system and other requirements, derived requirements, derivation rationale, allocations, traceability, and requirements status.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes".* Feel free to add clarifying comments in the margin.

continued on next page

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

continued on next page

4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 02: Derive and Allocate Requirements

PA 03: Develop Physical Architecture

Process area summary

The purpose of Develop Physical Architecture is to transform the functional architecture, as defined by the Derive and Allocate Requirements process area, into the physical architecture for the system. It involves deriving the physical architecture requirements, identifying the key design issues, determining the physical structure and interfaces, and allocating the physical architecture requirements. The practices described herein are expected to be performed iteratively until the design is handed off to the implementing or component engineering disciplines.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes	No	N/A	
[ ]	[ ]	[ ]	Derive the requirements for the physical architecture.
[ ]	[ ]	[ ]	Identify the key design issues that must be resolved to support successful development of the system.
[ ]	[ ]	[ ]	Generate physical structure alternative(s) and constraints, and select a solution in accordance with the Analyze Candidate Solutions process area.
[ ]	[ ]	[ ]	Develop the physical architecture's interface requirements for the chosen physical structure.
[ ]	[ ]	[ ]	Allocate the physical architecture requirements to the chosen physical structure.
[ ]	[ ]	[ ]	Maintain requirements traceability for the physical architecture requirements to ensure that lower level (derived) requirements are necessary and sufficient to meet the needs of higher level requirements or design.
[ ]	[ ]	[ ]	Describe the physical architecture by capturing the design results and rationale.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes".* Feel free to add clarifying comments in the margin.

continued on next page

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

continued on next page

4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 03: Develop Physical Architecture

PA 04: Integrate Disciplines

Process area summary

The purpose of Integrate Disciplines is to identify those disciplines necessary for effective system development and create an environment in which they jointly and effectively work together toward a common agenda. Each discipline's unique expertise and concerns are forwarded and considered, but the focus on total system development is maintained. These disciplines may include, but are not limited to, marketing, manufacturing, component design, development (e.g., hardware, software, or firmware), reliability, maintainability, supportability, human factors, logistics, safety, and security. It is critical to be able to meld such disciplines without sacrificing their parochial interests concerning issues important to and unique to each discipline. This environment must persist throughout the system development life cycle.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes	No	N/A	
[ ]	[ ]	[ ]	Identify the disciplines that are directly or indirectly essential to system development.
[ ]	[ ]	[ ]	Familiarize individuals involved in the development effort with the various disciplines and their roles in creating a successful system.
[ ]	[ ]	[ ]	Actively promote cross-discipline understanding within the development team.
[ ]	[ ]	[ ]	Establish methods for interdisciplinary coordination.
[ ]	[ ]	[ ]	Establish methods for identifying and resolving interdisciplinary issues.
[ ]	[ ]	[ ]	Follow established interdisciplinary methods to achieve integrated solutions to identified issues or problems.
[ ]	[ ]	[ ]	Communicate results of interdisciplinary activities to affected groups.
[ ]	[ ]	[ ]	Develop project goals and ensure that each project member and direct support person is fully aware of them.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes"*. Feel free to add clarifying comments in the margin.

continued on next page

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

continued on next page

4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 04: Integrate Disciplines

PA 05: Integrate System

Process area summary

The purpose of Integrate System is to ensure that system elements will function as a whole. This primarily involves identifying, defining, and controlling interfaces, as well as verifying system functions that require multiple system elements. The activities associated with Integrate System occur throughout the entire life cycle of system development.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes	No	N/A	
[ ]	[ ]	[ ]	Develop detailed descriptions of the interfaces implied by the system architecture.
[ ]	[ ]	[ ]	Communicate the interface definitions and coordinate change requests with all system element developers who could be affected by interface changes.
[ ]	[ ]	[ ]	Verify the receipt of each system element required to assemble the system in accordance with the physical architecture.
[ ]	[ ]	[ ]	Verify the implemented design features of developed or purchased system elements against their requirements.
[ ]	[ ]	[ ]	Verify that the system element interfaces comply with the interface requirements prior to assembly.
[ ]	[ ]	[ ]	Assemble aggregates of system elements in accordance with the established integration strategy.
[ ]	[ ]	[ ]	Check the integrated system interfaces in accordance with the established integration strategy.
[ ]	[ ]	[ ]	Develop an integration strategy and supporting documentation which identifies the optimal sequence for receipt, assembly, and activation of the various components that make up the physical architecture of the system.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes"*. Feel free to add clarifying comments in the margin.

continued on next page

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

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4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 05: Integrate System

PA 06: Understand Customer Needs and Expectations

Process area summary

The purpose of Understand Customer Needs and Expectations is to elicit, stimulate, analyze, and communicate customer needs and expectations to obtain a better understanding of what will satisfy the customer. Understand Customer Needs and Expectations involves engaging the customer or their surrogate in ongoing dialogue designed to translate his/her needs and expectations into a verifiable set of requirements which the customer understands and which provide the basis for agreements between the customer and the systems engineering effort.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes No N/A

[ ] [ ] [ ] Elicit customer needs, expectations, and measures of effectiveness.

[ ] [ ] [ ] Analyze customer needs and expectations to develop a preliminary operational concept of the system as appropriate.

[ ] [ ] [ ] Develop a statement of system requirements.

[ ] [ ] [ ] Obtain concurrence from the customer that the agreed upon customer requirements satisfy their needs and expectations.

[ ] [ ] [ ] Inform the customer on a regular basis about the status and disposition of needs, expectations, and measures of effectiveness.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes".* Feel free to add clarifying comments in the margin.

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

continued on next page

4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 06: Understand Customer Needs and Expectations

PA 07: Verify and Validate System

Process area summary

The purpose of Verify and Validate System is to ensure that the developer/supplier team performs increasingly comprehensive evaluations to ensure that evolving work products will meet all requirements. The activities associated with Verify and Validate System begin early in the development, address all work products (including requirements and design), and continue through system element development and integration. The scope of verification covers development of the full system, as well as its production, operation and support. Validation involves evaluation of the customer requirements against customer needs and expectations, and evaluation of the delivered system to meet the customer's operational need in the most representative environment achievable.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes	No	N/A	
[ ]	[ ]	[ ]	Establish plans for verification and validation that identify the overall requirements, objectives, resources, facilities, special equipment, and schedule applicable to the system development.
[ ]	[ ]	[ ]	Define the methods, process, reviews, inspections and tests by which incremental products are verified against established criteria or requirements established in a previous phase.
[ ]	[ ]	[ ]	Define the methods, process, and evaluation criteria by which the system or product is verified against the system or product requirements.
[ ]	[ ]	[ ]	Define the methods, process, and evaluation criteria by which the system or product will be validated against the customer’s needs and expectations.
[ ]	[ ]	[ ]	Perform the verification and validation activities that are specified by the verification and validation plans and procedures, and capture the results.
[ ]	[ ]	[ ]	Compare the collected test, inspection, or review results with established evaluation criteria to assess the degree of success.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes".* Feel free to add clarifying comments in the margin.

continued on next page

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

continued on next page

4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 07: Verify & Validate System

PA 08: Ensure Quality

Process area summary

The purpose of Ensure Quality is to address not only the quality of the system, but also the quality of the process being used to create the system and the degree to which the project follows the defined process. The underlying concept of this process area is that high quality systems can only be produced on a continuous basis if a process exists to continuously measure and improve quality, and this process is adhered to rigorously. Key aspects of the process required to develop high quality systems are measurement, analysis, and corrective action.

This is not meant to imply that those managing and/or assuring the quality of work products and processes are solely responsible for the quality of the work product outputs. On the contrary, the primary responsibility for "building in" quality lies with the builders. The support of a quality management process adds confidence for the developers, management, and customers that all aspects of quality management are seriously considered and acted upon by the organization and reflected in its products.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes	No	N/A	
[ ]	[ ]	[ ]	Ensure the defined system engineering process is adhered to during the system development life cycle.
[ ]	[ ]	[ ]	Evaluate work product measures against the requirements for work product quality.
[ ]	[ ]	[ ]	Measure the quality of the systems engineering process used by the project.
[ ]	[ ]	[ ]	Analyze quality measurements to develop recommendations for quality improvement or corrective action as appropriate.
[ ]	[ ]	[ ]	Promote atmosphere that encourages employees to be attentive to quality issues and report quality problems.
[ ]	[ ]	[ ]	Initiate activities that address identified quality issues or quality improvement opportunities.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes"*. Feel free to add clarifying comments in the margin.

continued on next page

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

continued on next page

4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 08: Ensure Quality

PA 09: Manage Configurations

Process area summary

The purpose of Manage Configurations is to maintain data and status of identified configuration units, and to analyze and control changes to the system and its configuration units. Managing the system configuration involves providing accurate and current configuration data and status to developers and customers.

This process area is applicable to all work products that are desired to be placed under configuration management. An example set of work products that may be placed under configuration management could include hardware and software configuration items, design rationale, requirements, product data files, or trade studies.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes No N/A

[ ] [ ] [ ] Decide among candidate methods for configuration management
[ ] [ ] [ ] Identify configuration units that constitute identified baselines.
[ ] [ ] [ ] Maintain a repository of configuration data.
[ ] [ ] [ ] Control changes to established configuration units.
[ ] [ ] [ ] Communicate changes to status, proposed changes, and configuration data to affected groups.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes".* Feel free to add clarifying comments in the margin.

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

continued on next page

4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 09: Manage Configurations

PA 10: Manage Risk

Process area summary

The purpose of Manage Risk is to identify, assess, monitor, and mitigate risks to the success of both the systems engineering activities and the overall technical effort. This process area continues throughout the life of the project. Similar to Plan Technical Effort and Monitor and Control Technical Effort process areas, the scope of this process area includes both the systems engineering activities and the overall technical project effort, as the systems engineering effort on the project cannot be considered successful unless the overall technical effort is successful.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes No N/A

[ ] [ ] [ ] Develop a plan for risk management activities that is the basis for the risk identification, assessment, mitigation, and monitoring activities for the life of the project.

[ ] [ ] [ ] Identify project risks by examining project objectives with respect to the alternatives and constraints and identifying what can go wrong.

[ ] [ ] [ ] Assess risks and determine the probability of occurrence and consequence of realization.

[ ] [ ] [ ] Obtain formal recognition of the project risk assessment.

[ ] [ ] [ ] Implement the risk mitigation activities.

[ ] [ ] [ ] Monitor risk mitigation activities to ensure the desired results are being obtained.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes"*. Feel free to add clarifying comments in the margin.

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

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4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 10: Manage Risk

PA 11: Monitor and Control Technical Effort

Process area summary

The purpose of Monitor and Control Technical Effort is to provide adequate visibility of actual progress and risks. Visibility encourages timely corrective action when performance deviates significantly from plans.

Monitor and Control Technical Effort involves directing, tracking and reviewing the project's accomplishments, results, and risks against its documented estimates, commitments, and plans. A documented plan is used as the basis for tracking the activities and risks, communicating status, and revising plans.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes No N/A

[ ] [ ] [ ] Direct technical effort in accordance with technical management plans.
[ ] [ ] [ ] Track actual resource utilization against technical management plans.
[ ] [ ] [ ] Track performance against the established technical parameters.
[ ] [ ] [ ] Review performance against the technical management plans.
[ ] [ ] [ ] Analyze issues resulting from technical parameter tracking and review activities to determine corrective actions.
[ ] [ ] [ ] Take corrective actions when actual results deviate significantly from plans.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes"*. Feel free to add clarifying comments in the margin.

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

continued on next page

4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 11: Monitor and Control Technical Effort

PA 12: Plan Technical Effort

Process area summary

The purpose of Plan Technical Effort is to establish plans that provide the basis for scheduling, costing, controlling, tracking and negotiating the nature and scope of the technical work involved in the system development. System engineering activities must be integrated into comprehensive technical planning for the entire project.

Plan Technical Effort involves developing estimates for the work to be performed, obtaining necessary commitments from interfacing groups, and defining the plan to perform the work.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes	No	N/A	
[ ]	[ ]	[ ]	Identify resources critical to the technical success of the project.
[ ]	[ ]	[ ]	Develop estimates for the factors that affect the magnitude and technical feasibility of the project.
[ ]	[ ]	[ ]	Develop cost estimates for all technical resources required by the project.
[ ]	[ ]	[ ]	Determine the technical process to be used on the project.
[ ]	[ ]	[ ]	Identify technical activities for the entire life cycle of the project.
[ ]	[ ]	[ ]	Define specific processes to support effective interaction with the customer(s) and supplier(s).
[ ]	[ ]	[ ]	Develop technical schedules for the entire project life cycle.
[ ]	[ ]	[ ]	Establish technical parameters with thresholds for the project and the system.
[ ]	[ ]	[ ]	Use the information gathered in planning activities to develop technical management plans that will serve as the basis for tracking the salient aspects of the project and the systems engineering effort.
[ ]	[ ]	[ ]	Review the technical management plans with all affected groups and individuals.
[ ]	[ ]	[ ]	Obtain commitment to the technical management plans from all affected groups and individuals.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes"*. Feel free to add clarifying comments in the margin.

continued on next page

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

continued on next page

4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 12: Plan Technical Effort

PA 13: Define Organization's Systems Engineering Process

Process area summary

The purpose of Define Organization's Systems Engineering Process is to create and manage the organization's standard systems engineering processes, which can subsequently be tailored by a project to form the unique processes that it will follow in developing its systems or products.

Define Organization's Systems Engineering Process involves defining the process that will meet the business goals of the organization, as well as designing, developing and documenting organizational process assets which are collected and maintained. Process assets is a term used to emphasize the investment nature of defining organizational processes; assets include example processes, process fragments, process-related documentation, process architectures, process tailoring rules and tools, and process measurements.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes	No	N/A	
[ ]	[ ]	[ ]	Establish goals for the organization's systems engineering process from the organization's business goals.
[ ]	[ ]	[ ]	Collect and maintain systems engineering process assets.
[ ]	[ ]	[ ]	Develop the organization's standard systems engineering process.
[ ]	[ ]	[ ]	Define guidelines for tailoring the organization's standard systems engineering process for project use in developing the project's defined process.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes".* Feel free to add clarifying comments in the margin.

continued on next page

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

continued on next page

4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 13: Define Organization's Systems Engineering Process

PA 14: Improve Organization's Systems Engineering Processes

Process area summary

The purpose of Improve Organization's System Engineering Processes is to gain competitive advantage by continuously improving the effectiveness and efficiency of the systems engineering processes used by the organization. It involves developing an understanding of the organization's processes in the context of the organization's business goals, analyzing the performance of the processes, and explicitly planning and deploying improvements to those processes.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes No N/A

[ ] [ ] [ ] Appraise the existing processes being performed in the organization to understand their strengths and weaknesses.

[ ] [ ] [ ] Plan improvements to the organization's processes based on an analysis of the impact of potential improvements on achieving the goals of the processes.

[ ] [ ] [ ] Change the organization's standard systems engineering process to reflect targeted improvements.

[ ] [ ] [ ] Communicate process improvements to existing projects and to other affected groups, as appropriate.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes"*. Feel free to add clarifying comments in the margin.

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

continued on next page

4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 14: Improve Organization's Systems Engineering Processes

PA 15: Manage Product Line Evolution

Process area summary

The purpose of Manage Product Line Evolution is to establish and provide the necessary resources for acquiring, developing, and applying technology to a product line for competitive advantage.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes No N/A

[ ] [ ] [ ] Define the types of products to be offered.
[ ] [ ] [ ] Identify new product technologies that will help the organization acquire, develop, and apply technology for competitive advantage.
[ ] [ ] [ ] Make the necessary changes in the product development cycle to support the development of new products.
[ ] [ ] [ ] Ensure critical components are available to support planned product evolution.
[ ] [ ] [ ] Manage the insertion of new technology into product development, marketing, and manufacturing processes.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes".* Feel free to add clarifying comments in the margin.

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

continued on next page

4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 15: Manage Product Evolution

PA 16: Manage Systems Engineering Support Environment

Process area summary

The purpose of Manage Systems Engineering Support Environment is to provide the technology environment needed to develop the product and perform the process. The insertion of development and process technology into the environment is executed with a goal of minimizing disruption of development activities while upgrading to make new technology available.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes	No	N/A	
[ ]	[ ]	[ ]	Maintain awareness of the technologies that support the organization's business goals.
[ ]	[ ]	[ ]	Determine requirements for the organization's systems engineering support environment based on organizational needs.
[ ]	[ ]	[ ]	Assess the systems engineering support environment against the support environment requirements.
[ ]	[ ]	[ ]	Obtain a systems engineering support environment that meets the requirements for supporting systems engineering by using the practices in the Analyze Candidate Solutions process area.
[ ]	[ ]	[ ]	Tailor the systems engineering support environment to individual project needs.
[ ]	[ ]	[ ]	Insert new technologies into the systems engineering support environment based on the organization's business goals and the projects' needs.
[ ]	[ ]	[ ]	Maintain the systems engineering support environment to continuously support the projects dependent on it.
[ ]	[ ]	[ ]	Monitor the systems engineering support environment for improvement opportunities.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes"*. Feel free to add clarifying comments in the margin.

continued on next page

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
3.2.3	Use data on performing the defined process to manage it?	
4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

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4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 16: Manage Systems Engineering Support Environment

PA 17: Manage Systems Engineering Training

Process area summary

The purpose of Manage Systems Engineering Training is to ensure that individuals within the organization have the necessary skill mix to perform their assigned tasks effectively. To achieve this objective, the skill requirements for the systems engineering and related positions within the organization need to be identified, as well as the specific project's or organization's needs such as emergent technology and new products, processes, and policies.

1. Base practices

Comments:

Are the practices identified below performed as part of your project? **Please note: you do not have to personally be involved in performing the practice -- it's enough that it is known who performs it.**

Yes No N/A

[ ] [ ] [ ] Identify training needs throughout the organization using the projects' needs, organizational strategic plan, and existing employee skills as guidance.
[ ] [ ] [ ] Prepare training materials based upon the identified training needs.
[ ] [ ] [ ] Train personnel to have the skills and knowledge needed to perform their assigned roles.
[ ] [ ] [ ] Assess the effectiveness of the training to meet the identified training needs.
[ ] [ ] [ ] Maintain records of training and experience.
[ ] [ ] [ ] Maintain training materials in an accessible repository.

If all of your answers were "No" or "N/A", skip to the next process area. Otherwise, answer the following questions *in relation to the practices for which you answered "Yes"*. Feel free to add clarifying comments in the margin.

2. Performing the work

Comments:

Indicate (√, or ? if not known) if the following SE-CMM generic practices are performed as part of doing the work associated with *this* process area.

ID	Do those involved in performing the base practices of this process area ...	√
2.2.1	Use documented plans, standards, and/or procedures in implementing the process area?	
2.2.2	Place work products of the process area under version control or configuration management, as appropriate?	
2.3.1	Verify compliance of the process with applicable standards and/or procedures?	
2.3.2	Verify compliance of work products with the applicable standards and/or requirements?	
3.2.1	Use a well-defined process in implementing the process area?	
3.2.2	Perform defect reviews of appropriate work products of the process area?	
5.2.1	Perform causal analysis of defects?	

continued on next page

3. Process management

Comments:

Indicate (√, or ? if not known) if the process associated with the Analyze Candidate Solutions process area is managed using the following generic practices.

ID	Do those involved in managing processes based on these base practices ...	√
2.1.1	Allocate adequate resources (including people) for performing the process area?	
2.1.2	Assign responsibilities for developing the work products and/or providing the services of the process area?	
2.1.3	Document the approach to performing the process area in standards and/or procedures?	
2.1.4	Provide appropriate tools to support performance of the process area?	
2.1.5	Ensure that the individuals performing the process area are appropriately trained in how to perform the process?	
2.1.6	Plan the performance of the process area?	
2.4.1	Track the status of the process area against the plan using measurement?	
2.4.2	Take corrective action as appropriate when progress varies significantly from that planned?	
3.1.2	Tailor the organization's standard process family to create a defined process that addresses the particular needs of a specific use?	
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4.2.1	Determine the process capability of the defined process quantitatively?	
4.2.2	Take corrective action as appropriate when the process is not performing within its process capability?	
5.2.2	Eliminate the causes of defects in the defined process selectively?	
5.2.3	Continuously improve process performance by changing the defined process to increase its effectiveness?	

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4. Supporting infrastructure

Comments:

Indicate (√, or ? if not known) if the organizational infrastructure supports analyzing candidate solutions by making the activities related to these processes visible to the organization as a whole.

ID	Are the following visible and available to those using the organization's processes?	√
3.1.1	Documenting a standard process or family of processes for the organization, that describes how to implement the base practices of the process area?	
4.1.1	Establishing measurable quality goals for the work products of the organization's standard process family?	
5.1.1	Establishing quantitative goals for improving process effectiveness of the standard process family, based on the business goals of the organization and the current process capability?	

end of PA 17: Manage Systems Engineering Training

Appendices

Introduction

These appendices provide support materials that organizations using SAM may find helpful in constructing appraisal artifacts and training team members.

In these appendices

Topic	See Page
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-33
Appendix F: Site Coordination Checklist	A-49
Appendix G: Approved SAM Requirements	A-57
Appendix H: Traceability Matrix to SEI CMM Appraisal Framework	A-63
Appendix I: References	A-73
Appendix J: SAM Questionnaire	A-75

Appendix A: Template for SAM Opening Briefing

Introduction

The opening briefing template provides ideas on how to present the basic concepts of SAM and the SE-CMM to the appraisal participants. However, appraisers are welcome to design whatever materials suit their style/needs. The basic purpose of the opening briefing and suggested contents are found in Section 2.2.1.

Also included in this appendix are some of the basic information charts included in the SE-CMM Project Overview briefing. For audiences who are somewhat unfamiliar with the model, these charts or similar ones may be of use as backup charts for the opening briefing to help answer questions about the model itself.

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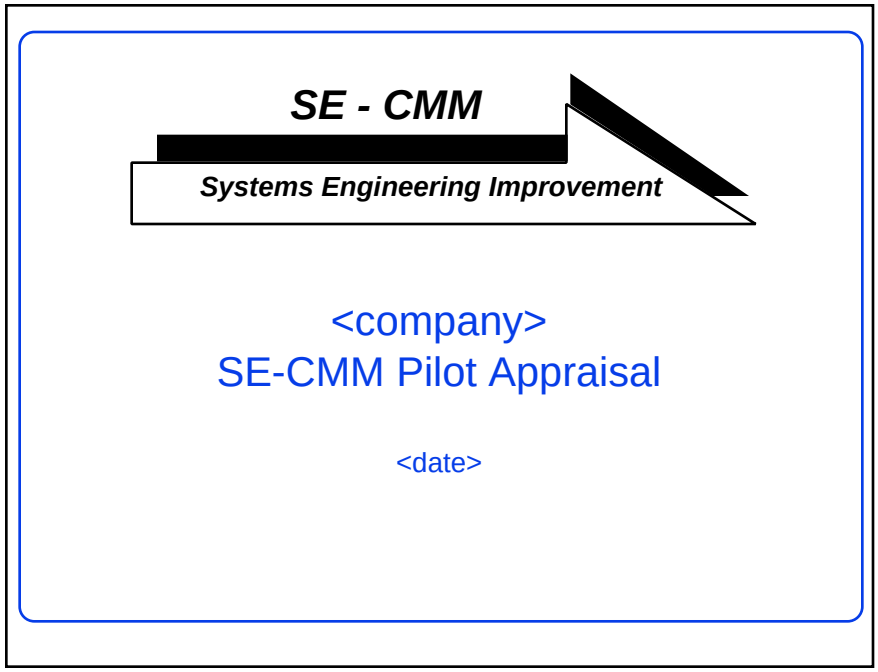

Process Maturity

- Benefits of process maturity
  - Increased accuracy in predicting results
  - Reduced variability in expected outcome
  - Improved productivity
- Organizational Agility
  - New Technology
  - New Markets
- People and Technology

continued on next page

Process Maturity Models

A maturity model defines the requirements for a process

- Defines "what" NOT "how"
- Does NOT address People & Technology

Framework for describing key elements of an effective process

- Requirements for Process Definition
- Guidance for Process Improvement

Yardstick for judging the maturity of an organization's process

- Contractor Selection
- Process Improvement Metric

Process Maturity Elements

- Process Elements — "*What you do*"
  - Process Areas
  - Base Practices
- Maturity Elements — "*How well you do it*"
  - Maturity Levels
  - Common Features
  - Generic Practices
- Assessment Process — "*How we measure it*"

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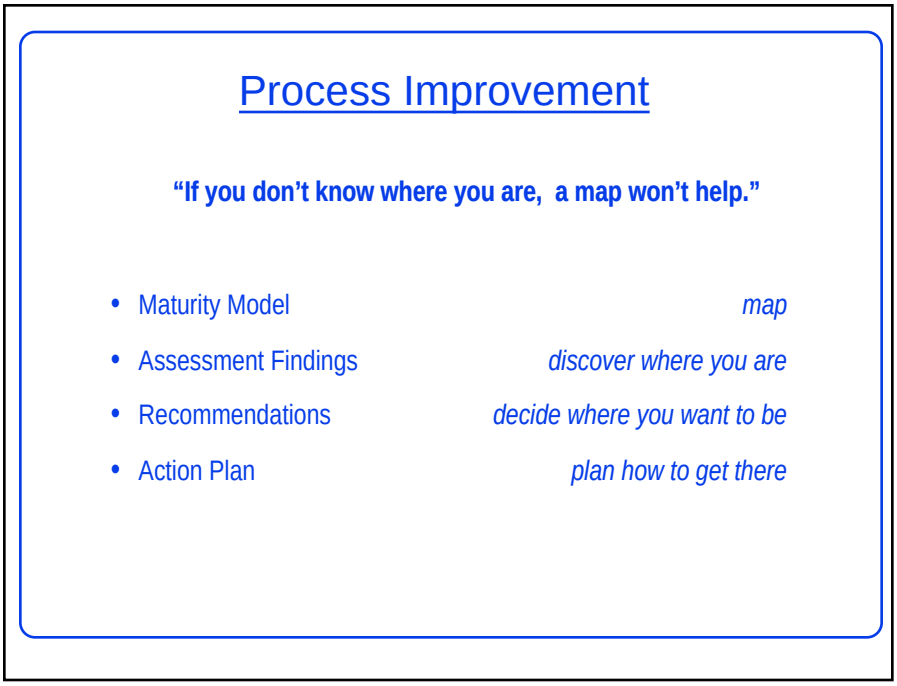

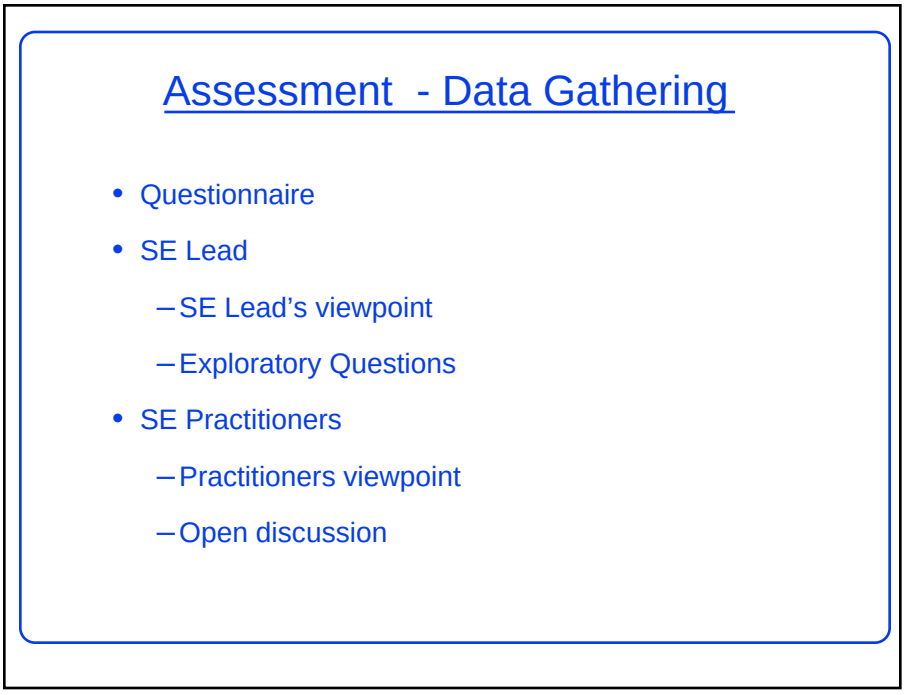

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Confidentiality

The assessment depends on your frank & open discussions!

- No project or individual will be identified in the findings
- The team will not discuss your comments outside the assessment
- We expect you not to discuss what you hear during our meetings

Tight schedule - Meetings will start on time!

Assessment - Results

- Products
  - Findings Briefing
  - Level of maturity for each process area
- Next Steps
  - Final Briefing
  - Findings & Recommendations Report
  - Action Plan

continued on next page

Extra briefing charts

The following set of charts may be useful as backup charts if the audience is not sufficiently familiar with the SE-CMM model itself.

SE - CMM

Industry ----- Academia ---- Government → ***Systems Engineering Improvement***

What is Systems Engineering?

(Many definitions of systems engineering have been published. The authors chose to use the definition of systems engineering from AFM 770-78:)

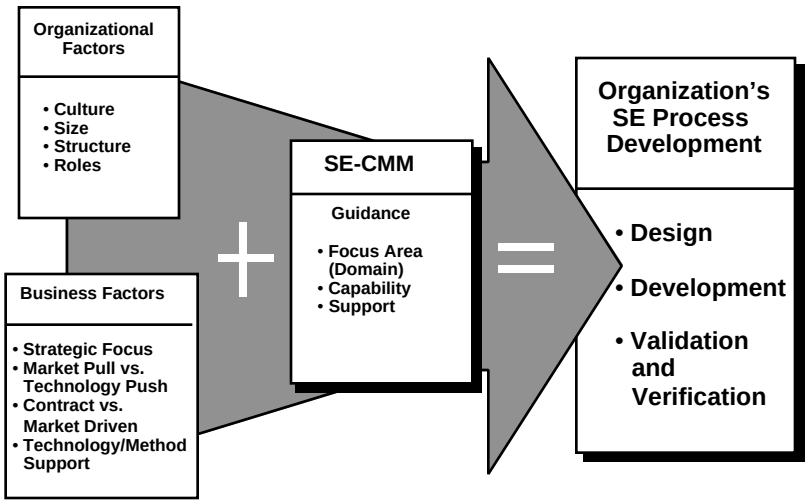
Systems Engineering is defined as the selective application of scientific and engineering efforts to:

1. **Transform** an operational need into a description of a system configuration which best satisfies the operational need according to the measures of effectiveness;
2. **Integrate** related **technical parameters** and ensure compatibility of all physical, functional, and technical program interfaces in a manner which optimizes the total system definition and design;
3. **Integrate** the efforts of **all engineering disciplines** and specialities into the total engineering effort.

##

SE - CMM

Industry ----- Academia ---- Government → ***Systems Engineering Improvement***



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SE - CMM

Industry ----- Academia ---- Government → ***Systems Engineering Improvement***

The SE-CMM models....

The *Characteristics* of good systems engineering practice

It does NOT model "The SE Process"

SE-CMM focuses on:

- ***Domain*** (e.g., systems engineering) **specific characteristics** indicative of a successful SE implementation
- **Characteristics** pertaining to ***institutionalizing process focus*** within a project or organization
- **Characteristics** of processes related to ***quantitative process management*** principles

##

SE - CMM

Industry ----- Academia ---- Government → ***Systems Engineering Improvement***

How is the model organized?

Into two prime focus areas:

- **Process areas** - which concentrate activities typically associated with the **successful practice** of Systems Engineering, plus other activities which critically impact effective execution of SE tasks
- **Capability levels** - with Common Features which reflect the characteristics one expects to see at **increasing levels of sophistication** in process management

##

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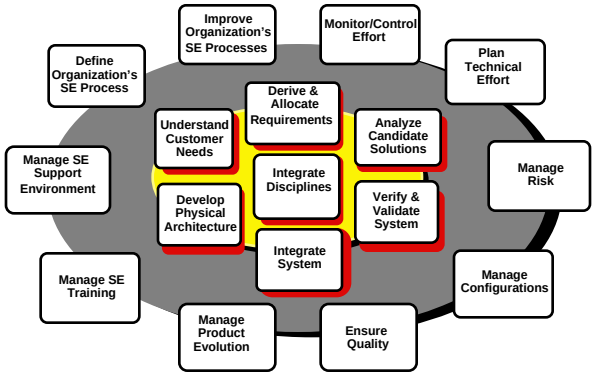
SE - CMM

Industry ----- Academia ---- Government → ***Systems Engineering Improvement***



##

SE - CMM

Industry ----- Academia ---- Government → ***Systems Engineering Improvement***

Process Area List

Engineering	Project	Organization
Understand customer needs and expectations	Manage configurations	Define organization's systems engineering process
Derive and allocate requirements	Plan technical effort	Manage systems engineering support environment
Analyze candidate solutions	Monitor and control technical effort	Manage systems engineering training
Develop physical architecture	Manage risk	Manage product line evolution
Integrate system	Ensure quality	Improve organization's systems engineering processes
Verify & validate system		
Integrate disciplines		

##

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SE - CMM

Industry ----- Academia ---- Government → ***Systems Engineering Improvement***

Capability Levels - Common Features

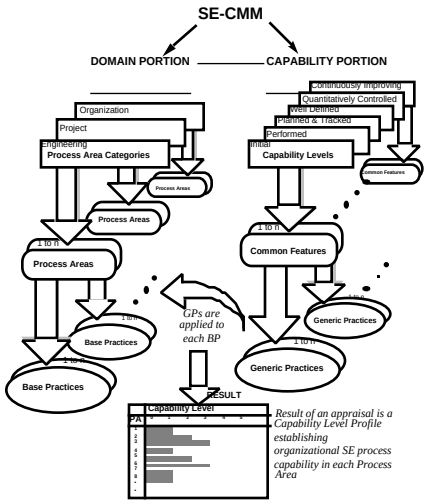
Initial	• None
Performed Informally	• Base practices performed
Planned & Tracked	• Committing to perform • Planning performance • Disciplined performance • Tracking and verifying performance
Well Defined	• Defining a standard process • Tailoring the standard process • Using data • Performing the defined process
Quantitatively Controlled	• Establishing measurable quality goals • Determining process capability to achieve goals • Objectively managing performance
Continuously Improving	• Establishing quantitative process effectiveness goals • Improving process effectiveness

##

SE - CMM

Industry ----- Academia ---- Government → ***Systems Engineering Improvement***

SE-CMM Architecture



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"Typical" Process Area

PA 05: Integrate System

- **The purpose of Integrate System is to ensure that system elements will function as a whole. This primarily involves identifying, defining, and controlling interfaces, as well as verifying system functions that require multiple system elements.**

##

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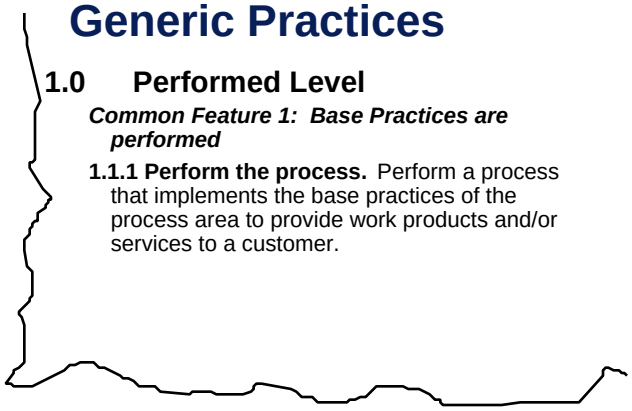
"Typical Generic Practice"

Generic Practices

1.0 Performed Level

Common Feature 1: Base Practices are performed

1.1.1 Perform the process. Perform a process that implements the base practices of the process area to provide work products and/or services to a customer.



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Relationships

Capability Level 2

Planned & Tracked

Common Features

- Planning Performance
- Disciplined Performance
- Tracking Performance
- Verifying Performance

Generic Practices

Planned & Tracked
2.1 Planning Performance
2.1.1Allocate resources
2.1.2 Assign responsibilities
2.1.3 Document the process
2.1.4 Provide tools
2.1.5 Ensure training
2.1.6 Plan the process

##

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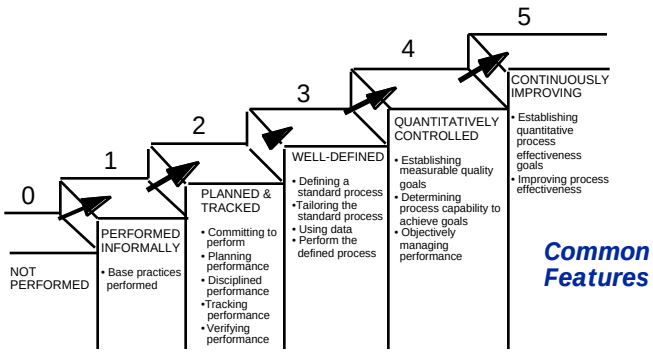
Roadmap for Improvement



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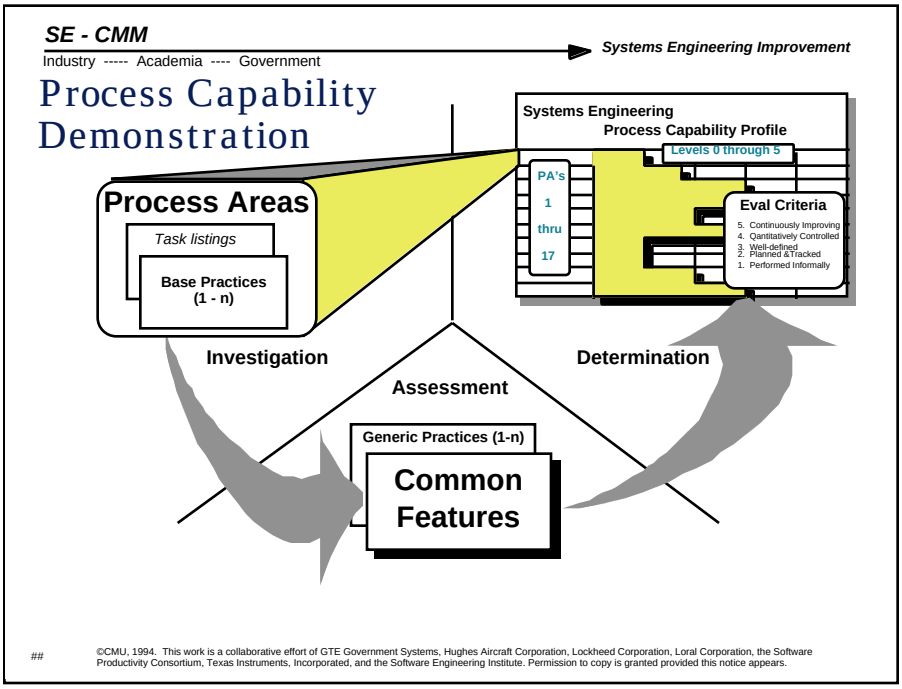
SE - CMM
Industry ----- Academia ---- Government
Systems Engineering Improvement
Process Capability Demonstration
Systems Engineering
Process Capability Profile
Levels 0 through 5
PA's
1
thru
17
Eval Criteria
5. Continuously Improving
4. Qantitatively Controlled
3. Well-defined
2. Planned &Tracked
1. Performed Informally
Process Areas
Task listings
Base Practices
(1 - n)
Investigation
Determination
Assessment
Generic Practices (1-n)
Common Features
##
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Appendix B: Template for SAM Final Findings Briefing

Introduction

The template for the final findings briefing provides ideas on how to present the findings resulting from the on-site period of the appraisal to the appraisal participants. Appraisers are welcome to design whatever materials suit their style/needs. The basic purpose of the final findings briefing and suggested contents are found in Section 2.2.14.

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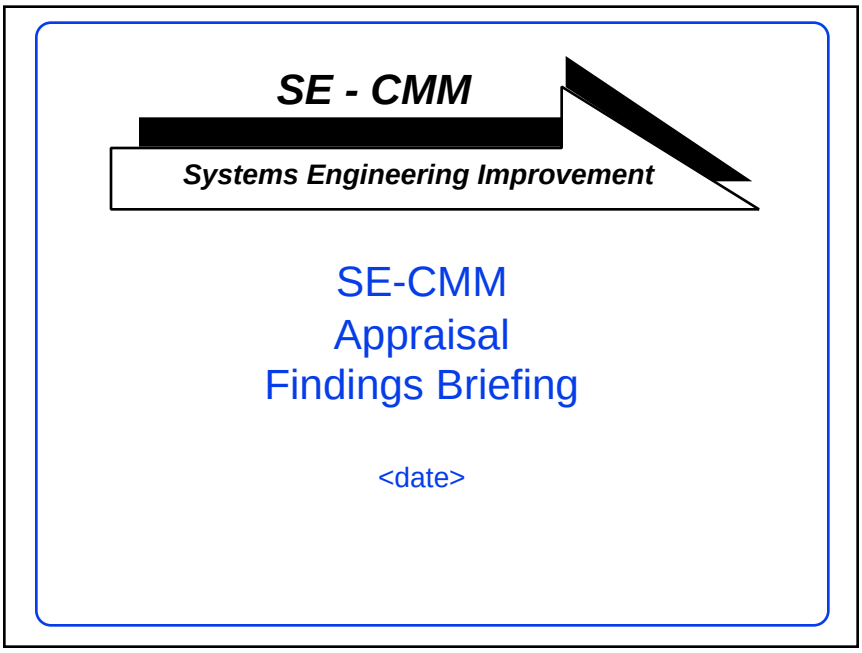

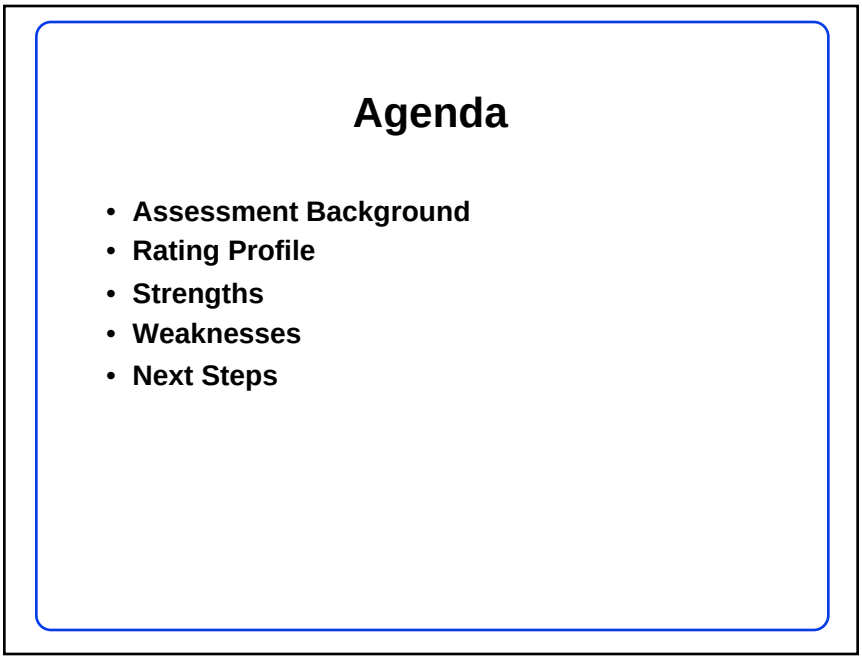

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Scope of the Assessment

- <organizational/site scope>
- Assessment followed the SE-CMM Appraisal Method <or cite tailoring>
- xx Systems Engineering Leads
  - <Proj A>
  - <Proj B>
  - ...
- xx systems engineers and support personnel chosen from an extended project set across the organization
- xx assessment team members

Assessment Team

- Assessment Team Leader:
  -
- Assessment Team Members
  -

continued on next page

Conduct of the Assessment Process

- Entire team highly responsive
- Strong consensus for systems engineering improvement
- Collaborative and enthusiastic participation
- Candid data gathering

Primary Assessment Objectives

- During On-site Week:
  - Understand our organization's current systems engineering practices
  - Identify key areas for process improvement
  - Pre-release training on model/appraisal method
- Post On-site Week
  - Develop findings and recommendation report
  - Develop an action plan
  - Management decision on focus of process improvement effort

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Next Steps

- Develop findings and recommendation report
- Develop an action plan
- Obtain senior management commitment
- Build consensus on needs
- Provide framework for actions
- Obtain support for actions

Findings Development Process

- Findings synthesize:
  - responses from questionnaires
  - SE leader interviews
  - SE interviews
  - SE leader feedback on preliminary findings
  - Assessment team background/experience
- Process
  - xxx Initial comments from multiple sources
  - Synthesized ~xx weaknesses, ~xx strengths and reviewed with SE leaders
  - Summarized high agreement weaknesses as 8 items
  - Presented strengths and xx summary weaknesses summary to SEs and SE leaders

continued on next page

Findings Development Process, continued

- **Findings Criteria**
  - **We heard it**
  - **No sweeping statements**
  - **Only issues with potential recommendations**
  - **Appraisal team consensus**

SE - CMM

Systems Engineering Improvement

Rating Profile

continued on next page

Process Area Ratings

PA #	PA Title
1	Analyze Candidate Solutions
2	Develop Fcnl/Perf Requirements
3	Develop Physical Architecture
4	Integrate Disciplines
5	Integrate System
6	Understand Customer Needs & Expectations
7	Verify & Validate System
8	Ensure quality
9	Manage Configurations
10	Manage Risk
11	Monitor & Control Technical Effort
12	Plan Technical Effort
13	Define Orgn's Systems Engrg Process
14	Improve Orgn's SE Processes
15	Manage Product Evolution
16	Manage Systems Engrg Support Environment
17	Manage Systems Engrg Training

RATING

<insert profile histogram or table here>

PA #

1=Performed Informally
2=Planned & Tracked
3=Defined Process
4=Quantitatively Controlled
5=Continuously Improving

SE - CMM

Systems Engineering Improvement

Findings Summary

continued on next page

Strengths

<these are some general ones to get the team started thinking>

- Dedicated People
- Commitment to customer satisfaction
- Technical competence
- Flexibility of workforce
- "Can do" attitude
- Historical successes
- Isolated pockets of successful process improvement efforts

<Finding Summary Title>

- Finding:
  - <finding summary framed as a problem statement>
- Causes:
  - <potential causes based on preliminary findings and other information heard by the appraisal team>
- Consequences:
  - <business-related consequences which provide a motivation for wanting to address the finding>

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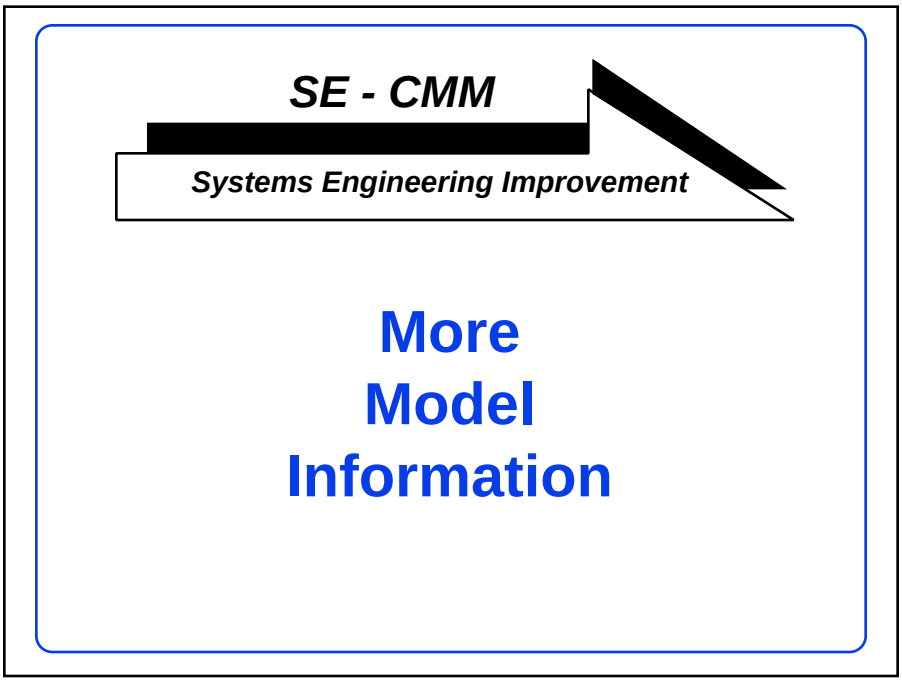

Weakness Mapping

- **Weakness findings relate to Process Areas:**

Finding	Process Area	PA #
<finding summary title>	<PA title related to finding>	#
<etc>		

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General '<capability level>' Barriers

- **Findings:**
  - **<findings which generally apply across the process areas which create a barrier to the next capability level>**
- **Consequences:**
  - **<process capability-related consequences of findings>**

Next Steps

- **Findings and Recommendations Report**
- **Action Plan**
- **Improvements!**

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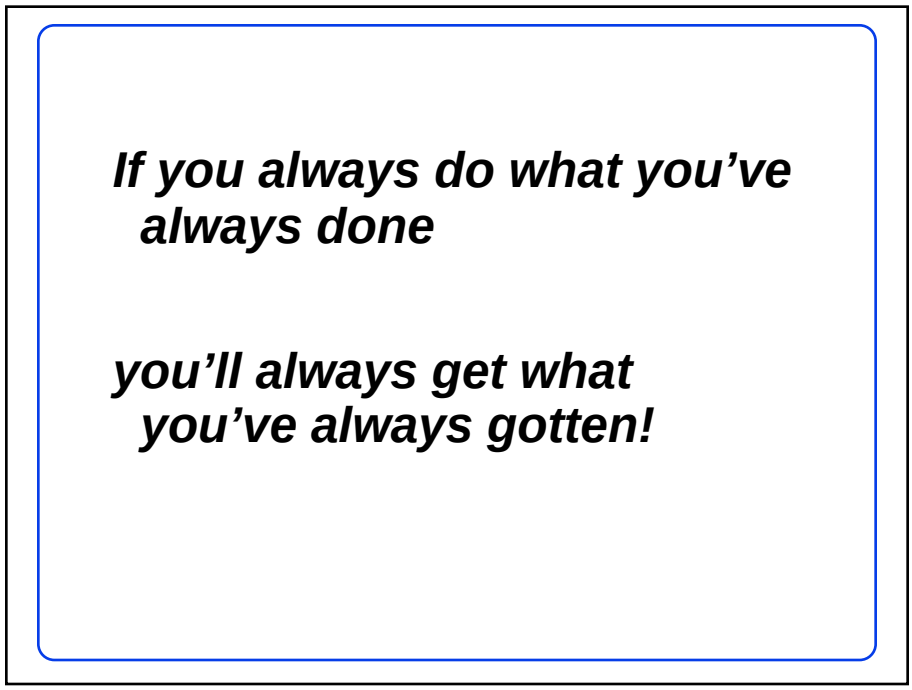

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Appendix C: Data Tracking Sheet and Instructions

Introduction

The data tracking sheet (DTS) is the primary tool used throughout the on-site period to consolidate and track the information being gathered from the different data sources used in the appraisal. It is a key input into the ratings and findings development process, and when used effectively, adds greatly to the team's ability to understand where sufficient data have been obtained, and where additional information is still needed about the practice of the base and generic practices within the appraised entity. The DTS is referred to throughout the process elements of the on-site period described in Chapter 2.

Symbols used in the DTS

Data in the DTS are recorded primarily via the use of four symbols:

\+ Indicates that information was heard or otherwise obtained which strengthens or corroborates the view that the practice under consideration is being performed.

\- Indicates that information was heard or otherwise obtained which weakens or opposes the view that the practice under consideration is being performed.

? Indicates that information was heard or otherwise obtained in relation to the practice, but the nature of the information was such that questions related to the performance of the practice have not been answered.

NA Indicates that the practice is considered not to be applicable to the appraised entity.

The use of these symbols is explained in the process element descriptions in the main body of the document, and illustrated in the blocks below.

Structure of the DTS

The DTS is composed of three pages per process area. Each page lists the short titles of the base practices for that PA and the generic practices for all five capability levels as the rows of a matrix. The columns of the matrix provide space to record the gathering of corroborating or opposing information in relation to the base and generic practices of the SE-CMM. Note that information other than that specifically related to the model is likely to be gathered in the team notes, and may be used to create findings where appropriate. However, these data are not specifically used in the creation of the rating and so are not recorded in the DTS.

continued on next page

DTS Contents

Table C-1 explains each of the columns of the DTS:

Column Title	Explanation
Base/Generic Practices	This column contains a listing of the short titles of the base practices for the listed PA, as well as all the generic practices.
Questionnaires A-G	These columns record the translation of the yes/no responses from the questionnaires of the respondents into +/-/?/NA symbols.
Interviews A-D	It is assumed that a maximum of four projects will be appraised in a single appraisal. These columns provide space for recording impressions from the initial interviews with the SE leads.
Practitioner Interviews	These columns provide space for recording impressions from the practitioner interviews, of which there are usually three focus groups.
Preliminary Rating	This the first estimate of the rating of each base or generic practice. Each team member uses the pattern of corroborating and opposing information to formulate an initial opinion of the performance of that practice in the appraised entity as a whole.
Preliminary Findings Review A-D	These columns provide space for recording impressions from the preliminary findings review with the SE leads.
Draft Rating	This column is where the preliminary rating is refined with data gathered via the preliminary findings review, and is the rating that will be correlated with the findings development.
Findings Reviews	These columns provide space for recording information gathered during the draft findings reviews by the SE leads and practitioners.
Final Rating	This is the final rating for each base/generic practice upon which team has reached consensus, and is the basis for the profile that is presented in the final findings briefing.

Table C-1. DTS Contents.

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Diagram of an example DTS

A DTS can be created in a spreadsheet, database, or other tool compatible with the appraiser's environment. The following diagram provides an example of a DTS created in a spreadsheet environment.

			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								
	5.2.3	Improve Standard Process								

Figure C-1. DTS Example Diagram.

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Diagram of an example DTS, continued

			Interviews							Prelim
			A	B	C	D	Gp 1	Gp 2	Gp 3	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:		<same as above>							

			Findings Review							Final
			A	B	C	D	Oth	Oth	Oth	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:		<same as above>							

Figure C-1. DTS Example Diagram, continued

Appendix D: Sample Schedule for the On-Site Week

Introduction

A sample on-site schedule is provided in this section. This schedule is based on a sample of three projects for the appraisal and three sets of practitioner groups.

SAM Sample Schedule

SAM - Sample Schedule			
Start	Finish	Dur.	Description
Day #1			
8:00 AM	9:30 AM	1:30	Opening meeting
9:30 AM	12:00 PM	2:30	Brief team
12:00 PM	1:00 PM	1:00	Lunch
1:00 PM	5:00 PM	4:00	Analyze questionnaire and develop response
Day #2			
8:00 AM	9:30 AM	1:30	Interview SE lead #1
9:30 AM	11:00 AM	1:30	Interview SE lead #2
11:00 AM	12:30 PM	1:30	Interview SE lead #3
12:30 PM	1:30 PM	1:00	Lunch
1:30 PM	3:30 PM	2:00	Interview practioner group #1
3:30 PM	5:00 PM	1:30	Consolidate data
Day #3			
8:00 AM	10:00 AM	2:00	Interview practioner group #2
10:00 AM	12:00 PM	2:00	Interview practioner group #3
12:00 PM	1:00 PM	1:00	Lunch
1:00 PM	2:30 PM	1:30	Consolidate data
2:30 PM			Develop preliminary findings
Day #4			
8:00 AM	9:00 AM	1:00	Review preliminary findings with SE lead #1
9:00 AM	10:00 AM	1:00	Review preliminary findings with SE lead #2
10:00 AM	11:00 AM	1:00	Review preliminary findings with SE lead #3
11:00 AM	12:00 PM	1:00	Consolidate data
12:00 PM	1:00 PM	1:00	Lunch
1:00 PM			Draft findings and ratings
Day #5			
8:00 AM	9:00 AM	1:00	Present draft findings to practioners
9:00 AM	10:00 AM	1:00	Present draft findings to SE leads
10:00 AM	12:00 PM	2:00	Adjust draft findings
12:00 PM	1:00 PM	1:00	Lunch
1:00 PM	2:30 PM	1:30	Present final briefing
2:30 PM	3:30 PM	1:00	Conduct executive session
3:30 PM	4:30 PM	1:00	Wrap-up

Figure D-1. Sample SAM Schedule.

Appendix E: SAM Training Support

Introduction

The SE-CMM Project has not committed to producing training materials for SAM. However, the project recognizes that some training beyond similar organizational appraisal methods is necessary to prepare appraisal team members. Many of the materials provided in the SAM appendices can be viewed as training support materials. The information sheets provided in this appendix summarize the steps of the on-site period for SAM and provide an easy reference for appraisers to determine the sequence of events.

Conduct Opening Meeting

Goals

- Visibly demonstrate senior management support for the assessment process.
- Introduce principles of process management.
- Review schedule for the assessment period.

Participants:	Senior management + Assessment team + SE leads + Practitioners
Duration:	1.5 hour

Approach

The senior site manager begins this meeting by welcoming the assessment team and indicating management support for the assessment process. The assessment team leader delivers a brief presentation on process management and the assessment process flow. Finally, the site coordinator reviews the assessment schedule, reminding everyone of when and where they are expected to participate.

- ❑ Senior management opening.
  - Introduce and welcome assessment team.
  - Indicate support for assessment and process improvement.
  - Solicit full support and participation.
- ❑ Briefing on process management principles.
- ❑ Briefing on assessment process flow.
  - Stress openness.
  - Emphasize confidentiality.
- ❑ Review of assessment schedule.
- ❑ Question and answer period.

Familiarize Team with SAM

Goals

- Introduce the team to the assessment process.
- Prepare for the discussions with the SE leaders and practitioners.
- Review the answers to the questionnaire.

Participants:	Assessment team
Duration:	2 hours

This is an opportunity for the assessment team to begin to work together. The assessment steps are presented in greater detail than at the opening meeting, and the team's role in each step is clarified. The assessment work begins with a review of the answers to the questionnaire along with the exploratory questions for the project leaders. The exploratory questions may be tailored where special conditions are identified.

Approach

- ❑ Team building exercise (optional).
- ❑ Review of assessment steps.
  - Explain conduct of SE leader discussions.
  - Explain conduct of practitioner discussions.
- ❑ Examine exploratory questions and answers to the questionnaire.
- ❑ Review assessment schedule.
- ❑ Question and answer period.

Analyze Questionnaire

Goals

- Review the answers to the questionnaire.
- Develop exploratory questions.
- Prepare for discussions with the SE leader.

Participants: Assessment team

Duration: ~4 hours

The assessment begins with a review of the answers to the questionnaire. Based on the answers to the questionnaire, the team develops exploratory questions. Approximately 40-50 questions should be generated for each project lead. The questions should be designed to elicit more then just a "yes/no" response. For example, questions often begin with, “Would you please describe . . .” When developing a question we are often looking for certain responses, e.g., “SE management plan”. Note these words as “listen fors," which 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.

Questions should be used to refine answers or explore inconsistencies. There is a separate set of questions for each SE lead. However, there is usually some overlap. Once the questions are developed, they should be transcribed onto the appropriate form, and copies made for each team member. The form should include each question, any “listen fors," document requests, and room for notes.

Approach

- ❑ Review answers to the questionnaire.
- ❑ *Brainstorm* a preliminary set of questions.
- ❑ Organize and eliminate redundant questions, add “listen fors".
- ❑ Transcribe questions onto forms and make copies for team.
- ❑ Review next day’s schedule.

Interview SE Leads

Goals

- Resolve any misunderstandings from the questionnaire.
- Clarify any anomalies or inconsistencies.
- Focus assessment team on process areas that need improvement.

Participants:	Assessment team + SE leads (separately)
Duration:	1.5 hour for each project (+ breaks in between)

Approach

The team leader will conduct the discussions. All other team members should take notes. Any team member can ask a question, although the team leader should be allowed to lead the questioning to ensure that all high-priority questions are covered. The team leader should follow-up on the “listen fors" and note any document requests.

- ❑ Introduce SE lead and the team.
- ❑ Repeat confidentiality rules
  - No individuals or projects named in results.
  - They may *not* disclose comments of others made at this meeting.
  - Team will take notes. All notes will be treated as confidential.
- ❑ Explain the purpose of this session.
- ❑ Cover the material in the exploratory questions.
- ❑ Remind SE lead of any document requests.
- ❑ Remind SE lead of the time and place for the preliminary findings review.
- ❑ Thank and excuse SE lead.

Consolidate Data from SE Lead Interviews

Goals

- Give team members a chance to reflect on previous sessions.
- Discuss any confusing or missing information.
- Perform adjustments to up-coming activities.

Participants:	Assessment team
Duration:	1.0 to 1.5 hours

Approach

These sessions give the team a chance to absorb the data they have been given in previous sessions. They begin by reviewing their notes and then discuss any confusing or missing data. Next, changes (if any) to upcoming activities are discussed.

- ❑ Quietly review notes.
- ❑ Discuss issues.
- ❑ Adjust upcoming activities.

Interview Practitioners

Goals

- Hear concerns and views from the perspective of the practitioners.
- Verify information gathered from questionnaire and discussions with the SE leaders.
- Listen for new process issues or areas of concern.

Participants:	Assessment team + 1 Practitioner group (6-10 practitioners) per session
Duration:	2 hours for each session + break in between

Approach

Each group consists of 6-10 professionals considered to be experts and opinion leaders in the organization. They should be actually working on projects (i.e., not staff or management). The team leader opens and closes each session and facilitates the discussion. Assessment team members need to relax and let the discussion flow: do *not* lead the discussions. All assessment team members should, however, take notes during these discussions. Team members should occupy every other seat around the table in order to avoid an "us vs. them" atmosphere.

- ❑ Introduce the topic (if appropriate).
- ❑ Explain the conduct of the meeting.
  - How the operation looks to them.
  - Free-form discussion (team will not ask specific questions).
  - Chance to summarize your major issues at the end.
- ❑ Repeat confidentiality rules.
  - No individuals or projects named in results.
  - They may *not* disclose comments of others made at this meeting.
  - Team will take notes. All notes will be treated as confidential.
- ❑ Introduce everyone (state name and function).
- ❑ Turn meeting over to the practitioners.
- ❑ About 20-30 minutes from the end (5 minutes per person), ask each practitioner

  If you could change one thing in your organization other then your boss or your paycheck, what would it be?

  Other than the people, what do you think is this organization's major strength?
- ❑ Remind practitioners of the time and place for the draft briefing presentation.
- ❑ Thank and excuse the practitioners.

Develop Preliminary Findings

Goals

- Identify list of key process issues.
- Generate preliminary findings.

Participants:	Assessment team only
Duration:	3-9 hours

Approach

Focus on issues for the entire organization. It is important that the findings have the broadest possible application, both to preserve confidentiality and have maximum impact with senior management. Try to keep the goals in mind and use the team's expertise to solve the problems. Avoid the following:

- Issues without useful recommendations.
- Findings based on hearsay.
- Sweeping statements.

Formulating the findings is the most difficult part of the assessment. We begin with preliminary findings which are 40-60 simple statements. At this point in the assessment, it is not necessary to have team consensus. Nor is it necessary to *word smith* the findings although redundant questions should be consolidated.

- ❑ Brainstorm a list of findings - organized by PA.
- ❑ Review each PA with issues and eliminate redundant questions.
- ❑ Transcribe list onto form and make copies for each team member.

Review Preliminary Findings

Goals

- Get feedback on preliminary findings.
- Collect any requested documentation.
- Ask SE leads for strengths and weakness.

Participants:	Assessment team + SE leads (separately)
Duration:	1 hour for each project

Approach

The team leader will conduct the session, and all other team members should take notes. Any team member can ask a question, although the team leader should be allowed to lead the questioning to ensure that all preliminary findings are covered.

- ❑ Re-introduce SE lead and the team.
- ❑ Repeat confidentiality rules.
  - No individuals or projects named in results.
  - They may *not* disclose comments of others made at this meeting.
  - Team will take notes. All notes will be treated as confidential.
- ❑ Collect any requested documents.
- ❑ Explain the purpose of this session.
- ❑ State each preliminary finding and ask:

  Is the finding true for your project?

  Is the finding true for the organization?
- ❑ About five minutes from the end ask:

  If you could change one thing in your organization other then your boss or your paycheck, what would it be?

  Other then the people, what do you think is this organization's major strength?
- ❑ Remind SE lead of the time and place for the draft findings presentation.
- ❑ Thank and excuse SE lead.

Develop Draft Rating

Goals

- Establish team consensus on process capability profile.
- Produce process capability profile for presentation in Final Briefing.

Participants:	Assessment team
Duration:	1-2 hours

Approach

As a result of the data gathering taken place so far, team members should have updated DTSs that reflect the data provided via the questionnaires, interviews, and any documentation reviews or presentations conducted. The profile is determined prior to synthesizing the draft finds so as to inform the team's decision making on how to prioritize the findings. The findings should provide the 7-9 top issues that improvement should focus on—without the rating process being relatively complete, issues which may have voluble supporters but do not provide significant leverage points could creep into the findings. The rating algorithm for SAM is relatively simple: 100% of applicable base practices should be exhibited throughout the entire sample of projects selected for a rating of "1" to be achieved, and 80-90% (depending on the capability level) of the generic practices.

❑ Step through each process area.

- Review notes from interviews
- Apply rating algorithm.
- Obtain team consensus on process area rating.

❑ Review profile as a whole for consistency.

❑ Determine presentation style for profile and prepare for the final briefing.

Develop Draft Findings

Goals

- Assign a level of practice for each PA.
- Identify list of (7 ± 2) key process issues
- Generate draft findings briefing.

Participants:	Assessment team only
Duration:	3-7 hours

Approach

The assessment team will assign a level of practice (0-5) for each PA. Use the questionnaire analysis and notes from the discussions to assist in this process.

Focus on issues for the entire organization. It is important that the findings have the broadest possible application, both to preserve confidentiality and have maximum impact with senior management. Limit the number of findings to 7 ± 2. This gives definite direction for process improvement without overloading limited resources. Each finding should consist of

Finding - A single statement of the issue.

Causes - Observations that contribute to the finding.

Consequences - Results that will get management attention, e.g., increased rework.

Preliminary findings are often found to be causes of a more general finding. Both findings and causes should reflect what the team has heard from the SE leads and the practitioners. The consequences are developed by the team to ensure management attention, and need not represent consequences voiced by the SE leader or the practitioners. Again, avoid issues without useful recommendations, unsubstantiated findings, or sweeping generalizations.

Formulating findings is the most difficult part of the assessment. It is the place where the team is most likely to have conflict. Try to keep the SE-CMM in mind and use the team's expertise to solve the problems. For each finding, the team should

- ❑ Identify level of practice for each PA.
- ❑ Review notes and discussions of preliminary findings.
- ❑ Refine issues into findings, causes, and consequences.
- ❑ Form mini-teams to *word smith* individual findings.
- ❑ Review each finding to reach consensus on wording (entire team).
- ❑ Complete briefing and produce overheads for presentation.

Present Draft Findings

Goals

- Provide SE leads and practitioners with the opportunity to comment on findings.
- Allow the team to judge the impact of the findings on the organization.
- Build organizational momentum for process improvement.

Participants:	Assessment team + Practitioners. Assessment team + SE leads (separate sessions)
Duration:	1 hour for each of two sessions

Approach

The assessment team leader presents the findings to the practitioners and SE leads in separate sessions, first to the practitioners, and then to the SE leads. These groups are kept separate so opening comments are not inhibited. The ratings are *not* presented at this time. In each session, the findings are first presented without interruption so that the audience has a chance to hear all of the findings. The presenter should use the *exact* wording from the slides. The presenter then steps through each finding and asks for comments. The assessment team members may assist the leader in explaining any issues, but should concentrate on taking notes.

- ❑ Welcome participants and set the context.
- ❑ Repeat confidentiality rules.
  - No individuals or projects named in results.
  - They may *not* disclose comments of others made at this meeting.
  - Team will take notes. All notes will be treated as confidential.
- ❑ Make presentation (without interruption).
- ❑ Repeat each finding and solicit comments.
- ❑ Remind participants of the time and place of the final presentation.

Adjust Draft Findings

Goals

- Refine wording for final findings presentation.
- Prepare final presentation.

Participants:	Assessment team
Duration:	2 hours

Approach

As a result of hearing the findings presentation and hearing the two groups' comments, the team will see places where the thrust or wording of some of the findings needs refinement. The goal should be to maximize the acceptance of the assessment. It is important to use the assessment to build momentum for process improvement. This sometimes requires weakening or strengthening the wording for a finding.

Therefore, a set of next steps should be scheduled that build on the findings and result in observable changes. If the organization's expectations are not satisfied, the opportunity for change may be lost forever!

❑ Step through each finding.

- Review notes from presentations.
- Refine wording.

Present Final Briefing

Goals

- *Visibly* present the results of the assessment to senior management.
- Build support for addressing the findings.
- Review next steps.

Participants:	Senior management + Assessment team + SE leads + Practitioners
Duration:	2 hours

Approach

The assessment team leader presents the final findings brief. The final briefing will include

1. Assessment scope - projects & participants (thank everyone!).
2. Rating -level of maturity for each PA.
3. Strengths - organization's strong points.
4. Findings - adjusted draft findings.
5. Next steps - findings & recommendations report, action plan, . . .

Brief Sponsor (optional)

Goals

- Provide additional background.
- Resolve any open issues with senior management.
- Discuss next steps.

Participants:	Senior management + whomever they wish to attend
Duration:	1 hour

Approach

This optional session gives senior management an opportunity to ask questions and discuss any issues that they were reluctant to raise in the open form of the final briefing. It is also an opportunity for the team leader (or the entire team) to promote follow-on activities. Remember that the confidentiality rules still apply! Do *not* let senior management use this session to fix blame for any problem or to attribute particular findings to a project or individual.

Conduct Wrap-up

Goals

- Evaluate the SE-CMM.
- Evaluate the assessment process.
- Plan next steps.

Participants:	Assessment team
Duration:	1 hour

Approach

The assessment team uses this session to generate feedback on the SE-CMM pilot assessment. Each team member completes the questionnaire evaluation form. These results, along with the questionnaire evaluation form from the SE leads is returned to the SE-CMM authors for review. Next, a discussion focuses on the model and the assessment process.

- ❑ Each team member completes a questionnaire evaluation form.
- ❑ The team discusses the SE-CMM. What works? What doesn't? What's missing?
- ❑ The team discusses what in the assessment process worked and what did not.

Before the team breaks, the next steps should be scheduled and responsibilities assigned.

- ❑ Discuss next steps.
  - Findings and recommendations report?
  - Action plan?
- ❑ Schedule next steps.

Appendix F: Site Coordination Checklist

Introduction

This checklist is used to support the SE-CMM appraisal site coordinator in preparing for the on-site period of the SE-CMM appraisal method (SAM).

Preparation tasks (prior to on-site period)

Major events that the site coordinator is responsible for arranging are described in the table below. The time frames given are approximate, and are based around the beginning of the on-site period. The coordinator can use this list as a checklist for preparation.

√	Task	Description	Time frame
	Executive briefing to obtain sponsorship for SAM	Briefing by site coordinator or facilitator, as appropriate, to the potential sponsor introducing the SE-CMM and SAM concepts.	At least six weeks prior to on-site period
	Determine confidentiality requirements	Determine with senior management the need for nondisclosure and confidentiality of agreements.	Four to six weeks prior to on-site period
	Select projects (three to four projects)	Site coordinator, working with the sponsoring manager, selects projects appropriate to the appraisal purpose.	Four to six weeks prior to on-site period
	Determine on-site week	Working with senior management and the facilitator, determine a week when the systems engineering leads, senior management, facilitators, and potential appraisal team members are available as needed.	Four to six weeks prior to on-site period

Table F-1. Preparation Tasks for Site Coordinator.

continued on next page

Preparation tasks, continued

√	Task	Description	Time frame
	Select appraisal team (five to seven team members plus one to two facilitators)	Site coordinator typically determines the pool of appraisal team members for consideration by management, unless the coordinator has been empowered to make the selection, in which case the selections are made. The facilitator is usually available to help in screening candidates. Provide a copy of the SE-CMM and SAM description to the appraisal team members.	Four to six weeks prior to on-site period; goal is to select the team far enough in advance to be able to get the team members to schedule the appraisal week
	Select systems engineering lead	For each project selected, identify the systems engineering leads for the selected projects and talk to them about their involvement. Also, verify their availability during the appraisal week (approximately six hours per person).	Three to four weeks prior to on-site period
	Select practitioners	Select potential interviewees in the selected projects as well as other projects in the organization being appraised. Typically, the facilitator is available to consult on participants, and management typically approves the participant list.	Three to four weeks prior to on-site period

Table F-1. Preparation Tasks for Site Coordinator, continued

continued on next page

Preparation tasks, continued

√	Task	Description	Time frame
	Administer questionnaire	The selected systems engineering leads (and other practitioners, if selected for questionnaire analysis) are provided with the SAM questionnaire, and the site coordinator provides the time frame for returning the questionnaire. Hand out the SE-CMM glossary with the questionnaire. The site coordinator should be available to answer any clarifying questions; usually a one or two day turnaround is requested if the questionnaires are not completed.	Two weeks prior to on-site period
	Handout about questionnaire	For pilots, when the questionnaire is handed out, also hand out the questionnaire about the questionnaire and emphasize the need for feedback from people who answer the questionnaire.	Two weeks prior to on-site period
	Collect questionnaire	The site coordinator collects the completed questionnaires, makes a copy for disaster recovery purposes, and mails questionnaires back to the facilitator for initial analysis.	To be received by facilitator one week prior to on-site

Table F-1. Preparation Tasks for Site Coordinator, continued

continued on next page

Preparation tasks, continued

√	Task	Description	Time frame
	Prepare appraisal team notebook	Prepare a three-hole binder for each appraisal team member which contains copies of the completed questionnaires and blank paper for taking notes. Tabs for each project, each practitioner discussion, preliminary findings, and findings briefing are often helpful. These notebooks are handed out during the team training at the beginning of the on-site period.	One week prior to on-site period
	Schedule rooms for opening and final briefing rooms	Schedule rooms large enough to hold all anticipated participants, including management, appraisal participants, and other identified invitees.	Two weeks prior to on-site period, depending on how tight facilities are
	Schedule rooms for practitioner interviews	Schedule rooms large enough to hold 20 people for the practitioner interviews.	Two weeks prior to on-site period, depending on how tight facilities are

Table F-1. Preparation Tasks for Site Coordinator, continued

continued on next page

Preparation tasks, continued

√	Task	Description	Time frame
	Schedule rooms for systems engineering lead interviews and assessment team	Schedule a room large enough for 10 people plus some extra workspace which can be blocked off for team use for the entire week of the on-site period. Preferably, this area is somewhere that can be locked at night, but not in an area that will require escort of the appraisal team members/facilitators during the week.	Two to three weeks prior to on-site period, depending on how tight facilities are

Table F-1. Preparation Tasks for Site Coordinator, continued

continued on next page

Preparation tasks, continued

√	Task	Description	Time frame
	Schedule support facilities	The following support tools should be provided: • If possible, a personal computer of the type most often used in the organization (usually Windows-based or Mac) and an associated dedicated laser printer scheduled for the week. (Desired software is MS Word and MS Powerpoint for current facilitator group.) • Instructions for obtaining photocopies in the building being used. (This is not much of an issue if a building familiar to the appraisal team members is being used.) • Lists of facilities, hotels, and restaurants that are close by (preferably with a map) and information on restaurant delivery service. • Flip charts/markers, transparencies, notepads, power strips, 3-hole punch, binders, lots of post-it notes.	Computer may take several weeks to arrange; other arrangements just need to be made prior to on-site period

Table F-1. Preparation Tasks for Site Coordinator, continued

continued on next page

Preparation tasks, continued

√	Task	Description	Time frame
	Schedule support staff	If possible, provide dedicated secretarial support for the last three days of the on-site period to provide transcription, revision, printing, reproduction and note-taking services. (In many cases the appraisal team ends up doing their own support, but having a secretary to do these tasks can really relieve some of the grunge work.)	Two to three weeks prior to on-site period
	Verify senior management schedule	Verify that senior management is prepared to attend and speak at the opening briefing, and attend the final briefing.	Two weeks, then one week prior to on-site period
	Verify participant schedule	Verify that participants are available in their allotted time slots; make any revisions necessary to the schedule.	Two weeks, then one week prior to on-site period
	Verify team member schedule	Verify that appraisal team members have no conflicts during the on-site period.	Two weeks, then one week prior to on-site period

Table F-1. Preparation Tasks for Site Coordinator, continued

Appendix G: Approved SAM Requirements

Introduction

This appendix contains the requirements for SAM approved by the SE-CMM Steering Group.

continued on next page

Introduction

The following requirements are synthesized from the "Sources of Requirements" v.3 used at the 3/8/94 SE-CMM author's meeting. In addition, some requirements (i.e., those in 6.0 and 7.0) are derived from the SEI's Common Appraisal Framework (CAF), with which the method is intended to be compatible. Ultimate compatibility with the CAF depends on the final form of that framework.

1.0 Scope

1.1 The 1994 SE-CMM Appraisal Method (SAM) scope is limited to assessment of the appraised entity's process capability.

1.2 The SAM deals with the diagnostic phase of a process improvement program.

1.3 v1.0 of the SAM is focused on appraisal to support self-improvement.

2.0 Applicability

The SAM will be

2.1 Applicable to multiple types of appraised entities (e.g., sites, organizations, and projects).

2.2 Adaptable to in-house process improvement situations.

2.3 Adaptable to supplier selection situations.

2.4 Applicable to contract-driven environments.

2.5 Applicable to market-driven environments

3.0 Pre-on-site work

3.1 Pre-on-site work for participants of SAM will be limited to four hours per appraisal participant.

3.2 Pre-on-site work for SAM appraisal team members will be limited to 40 hours per appraisal team member, not including training.

3.3 SAM appraisal team members will be trained prior to participation in an SE-CMM appraisal.

continued on next page

4.0 On-site work

4.1 On-site work for appraisal participants will be limited to five calendar days, of which not more than two staff-days per person will be required over that time.

4.2 SAM will target 8-10 hour days for skilled appraisal team members.

5.0 Post on-site work

5.1 Post-on-site work for appraisal participants will be limited to four hours per participant.

5.2 Post-on-site work for appraisal team members to complete the SAM-related work will be limited to 40 hours per team member.

continued on next page

6.0 CAF conformance

Note: The SE-CMM project intends for the SAM to conform to the SEI's common appraisal framework. This satisfies a higher level project requirement that the SE-CMM avoid conflicts with the CMM. The individual requirements below collectively serve this purpose.

6.1 The SE-CMM is the reference model for the SAM.

6.2 No applicable part of the SE-CMM is excluded in the SAM.

6.3 SAM uses the CAF rating scale:
- Satisfied
- Not satisfied
- Not applicable
- Not rated

6.4 Judgments made as part of SAM are made by the appraisal team.

6.5 Judgments made by the appraisal team address base practices, generic practices, and process areas.

6.6 CAF rules of evidence will be applied in SAM; i.e., data will be corroborated by multiple sources. (See CAF for specific rules of evidence.)

6.7 Confidence ratings will be determined as defined in the CAF, i.e., confidence associated with both the criteria selected and the execution of the method will be addressed.

6.8 The SAM will document how and where it conforms with the CAF.

6.9 The SAM will limit the number of appraisal team members to a minimum of four and a maximum of eight.

6.10 The SAM will require the appraisal team to document the domain of the appraisal (project, organization, site).

continued on next page

7.0 Appraisal activities	The following activities are required to be addressed in the SAM, to achieve CAF conformance: 7.1 Planning 7.2 Selection 7.2.1 Selection of appraised entity 7.2.2 Selection of appraisal team 7.3 Data collection 7.4 Data consolidation 7.5 Rating 7.6 Reporting 7.6 Post-appraisal activities
8.0 Confidence	8.1 SAM will address issues related to confidence and risk in versions beyond v1.0. Version 1.0 of SAM does not meet the CAF requirement to address confidence and risk.
9.0 Tailoring	9.1 SAM will describe limits of tailoring expected.
10.0 Coverage	10.1 SAM will describe coverage requirements related to a particular confidence rating.
11.0 Support materials	SAM will describe 11.1 The training materials required for an SE-CMM appraisal. 11.2 The supporting briefing materials required for an SE-CMM appraisal. 11.3 The supporting data-gathering materials required for an SE-CMM appraisal. 11.4 Data-analysis materials required for an SE-CMM appraisal.

Appendix H: Traceability Matrix to SEI CMM Appraisal Framework (CAF)

SAM/CAF conformance matrix

Requirement in CAF 1.0	SAM Paragraph
R1. Method documentation references:	
• Reference to CMM version	Abstract 1.1.2, Assumptions
• Reference to CAF version	This Appendix
• How it implements CAF appraisal activities	1.1.1 Phases 1.1.1 Relate to CBA-IPI
• How it implements CAF appraisal artifacts	1.1.3 Plan Appraisal Details 1.1.4 Exit Criteria 2.2.5 Consolidate Data 1 2.2.6 Interview Practitioners 2.2.7 Consolidate Data 2 2.2.9 Review Prelim Findings 2.2.10 Develop Draft Rating 2.2.13 Adjust Draft Rating 2.2.14 Final Briefing 2.2.15 Sponsor Briefing 2.2.16 Appraisal Wrap-up
• How it implements CAF appraisal guidance	This Appendix
R2. Guidance on:	
• Planning and preparing for appraisal	2.1 Preparation
• Conducting appraisal	2.1.4 to 2.3.3
• Reporting results	2.2.13 to 2.2.14 and 2.3.1 to 2.3.2

Table H-1. Traceability Matrix to SEI CAF

continued on next page

SAM/CAF conformance matrix, continued

Requirement	SAM Paragraph
R3. Guidance for:	
• Identifying appraisal goals	2.1.1 Sponsor Commit
• Identifying appraisal constraints	2.1.1 Sponsor Commit 2.1.2 Appraisal Parameters 2.1.3 Appraisal. Details
• Determining suitability wrt goals/constraints/Abstract to Scope	2.1.1 Sponsor Commit
R4. Guidance to select CMM scope	2.1.1 Purpose/Summary * 2.1.1 Tailor Parameters
R5. Guidance to select organizational scope	2.1.2 Summary Description
R6. Guidance to obtain organization. commitment	2.1.1 to 2.1.3
R7. Appraisal team qualification criteria:	
• >= 5 yrs experience for majority of team	* 1.3 Roles
• >= 25 yrs experience total on team	* 1.3 Roles
• >= 6 yrs management experience for manager on team	* 1.3 Roles
• >= 10 yrs management experience total for team	* 1.3 Roles
R8. Appraisal team leader has experience: **	
• Using appraisal method	* 1.1.3 Facilitator
• Managing teams	* 1.1.3 Roles
• Facilitating group discussions	1.1.3 Facilitator
• Making presentations	* 1.1.3 AT leader
R9. Guidance for determining appropriate team size	1.1.3 (1st paragraph.) 2.1.2 Table 2-5 * target = 6 members

Table H-1. Traceability Matrix to SEI CAF, continued

continued on next page

SAM/CAF conformance matrix, continued

Requirement	SAM Paragraph
R10. Guidance on preparing a team to do appraisal	1.4 Collect data 2.2.1 Table 2-10 2.2.2 SAM training
R11. Guidance for site selection	* 2.1.2 Select Parameters * based on goals/project status
R12. Guidance for project selection	* 2.1.2 Select Parameters * based on goals/project status
R13. Guidance for participant selection	1.1.3 Roles 1.1.4 to 2.1.4
R14. Guidance for appraisal participants	2.2.1
R15. Guidance for appraisal planning: • Identifies appraisal goals • Identifies appraisal scope • Identifies appraisal activities • Provides appraisal schedule • Identifies resources • Identifies outputs and their usage • Identifies anticipated follow-on activities • Documents tailoring and trade-offs • Identifies risks with appraisal execution	 2.1.1 Sponsorship 2.1.1 to 2.1.3 2.1.3 Plan 2.0 On-site (missing figure) 2.1.2 Summary 2.1.3 Summary 2.1.3 Summary 2.3.0 Post-Appraisal * 2.3.4 Develop Report 1.2 Summary/Tailor * 2.1.3 Summary * plan includes "force field"
R16. Guidance for time to conduct appraisal	2.1.0 Typical Duration
R17. Guidance for appraisal logistics	2.1.3 Summary * hours, meals, space, etc. Appendix C

Table H-1. Traceability Matrix to SEI CAF, continued

continued on next page

SAM/CAF conformance matrix, continued

Requirement	SAM Paragraph
R18. Define artifacts for:	
• Recording observations	2.1.4 Questionnaire 2.2.3 Generate Qs Appendix C
• Categorizing observations	2.2.5 Data Tracking Sheet
• Classifying observations	2.2.3 Summary
• Validating observations	2.2.5 Update DTS 2.2.6 Summary 2.2.7 Update DTS 2.2.9 Review Finds 2.2.10 Update DTS
• Recording coverage	* Use PA graphics with findings stickies to display coverage 2.2.7 Prelim ratings
• Making rating decisions	2.2.10 Draft rating 2.2.12 Present Finds
Reporting findings and ratings	2.2.14 Present brief 2.2.15 Brief sponsor 2.3.2 Output to others 2.1.3 Notes
Managing logistics	Appendix G, coord checklist

Table H-1. Traceability Matrix to SEI CAF, continued

continued on next page

SAM/CAF conformance matrix, continued

Requirement	SAM Paragraph
R19. Guidance to implement data collection techniques:	
• Administering instruments	2.1.4 Appraisal participants
• Conducting presentations	2.2.1 Table 2-10 2.2.9 Table 2-26 2.2.12 Table 2-32 * 2.2.14 Table 2-36 * 2.2.15 Table 2-38
• Conducting interviews	2.2.4 Table 2-16 2.2.6 Table 2-20
• Reviewing documentation	* 2.2.3 Table 2-14 * suggestions for process documentation/artifacts to ask for and quality attributes (add appendix template)
R20. Guidance for collecting data:	
• Extracting data from data gathering sessions	2.2.3 Table 2-14 * needs explicit map of instrument answers to KPAs
• Recording data as observations	2.2.5 Table 2-18 2.2.7 Table 2-22 2.2.10 Table 2-28 2.2.13 Table 2-34
• Classifying observations	2.2.5 Table 2-18 2.2.7 Table 2-22 2.2.10 Table 2-28
• Categorizing as CMM/non-CMM findings	* 2.2.3 Table 2-14 * note how to set up KPA graphics with non-CMM section(s)
• Categorizing as CMM/non-CMM findings	* 2.2.8 Table 2-24 * 2.2.11 Table 2-30

Table H-1. Traceability Matrix to SEI CAF, continued

continued on next page

SAM/CAF conformance matrix, continued

Requirement	SAM Paragraph
R21. Guidance for validating observations:	
• Corroboration from multiple, independent sources	2.2.5 Table 2-18 2.2.7 Table 2-22 2.2.10 Table 2-28 2.2.13 Table 2-34
• Interviews by doers of work or outcome document reviews	2.2.6 interviews
R22. Guidance to validate a portion of interview data by KPA (goal-related) documentation	2.1.4 Notes 2.2.3 Notes 2.2.4 Notes 2.2.6 Notes
R23. Guidance for observation coverage of scope and institutionalization:	
• Each goal satisfied	Not applicable
• Each KPA institutionalized (common features)	* 2.1.4 Summary * How generic practices are covered in Questionnaire and document review 2.2.10 Table 2-28 2.2.13 Table 2-34
• Each ML is satisfied	Not applicable
R24. Mechanisms to adjust collection to obtain coverage	2.2.3 Table 2-14 2.2.5 Table 2-18 2.2.7 Table 2-22 2.2.10 Table 2-28
R25. Guidance for collected data traceability to outputs	* 2.1.4 Summary * Add graphic display of +/- data from Questionnaire 2.2.5 Table 2-18 2.2.7 Table 2-22 2.2.10 Table 2-28 2.2.13 Table 2-34

Table H-1. Traceability Matrix to SEI CAF, continued

continued on next page

SAM/CAF conformance matrix, continued

Requirement	SAM Paragraph
R26. Require ratings of: • KPA: • Goals	 * 2.1.4 Summary * How generic practices are covered in Questionnaire and document review 2.2.10 Table 2-28 2.2.13 Table 2-34 Not applicable
R27. If appraisal calculates maturity level rating, consistent w/ five level scale in CMM for SW	Not applicable
R28. Rating process uses the rating values: • Satisfied • Unsatisfied • Not applicable • Not rated	Not applicable
R29. Rating process specifies: • Goals can be rated when coverage is sufficient • KPAs can be rated when goals have been • Maturity level can be rated when KPAs have been	 Not applicable (goals) Not applicable (goals) Not applicable (ML)
R30. Rating process uses consensus of team	2.2.10 Table 2-28 2.2.13 Table 2-34
R31. Ratings are based on CMM for software, V1.1	Not applicable
R32. Rating process requires ratings to be based on findings	2.2.10 Table 2-28 2.2.13 Table 2-34
R33. Rating process specifies goals are rated: • Satisfied (conditions) • Unsatisfied (conditions) • Not applicable (conditions) • Not rated (conditions)	Not Applicable (there are no goals included in the SE-CMM model)

Table H-1. Traceability Matrix to SEI CAF, continued

continued on next page

SAM/CAF conformance matrix, continued

Requirement	SAM Paragraph
R34. Rating process for KPAs based on goals	Not applicable
R35. Rating process which specifies maturity level by KPA satisfaction	Not Applicable
R36. Reports the team provides are identified:	2.1.1 Tailor Parameters 2.2.14 Summary 2.3.1 Lessons learned 2.3.2 Report to others
R37. Reporting includes the following data: • Scope • Selections (site, projects, participants, team) • Findings • Ratings • Risks associated with accuracy/completeness	 Appendix B (example) Appendix B (example) 2.2.11 Table 2-30 2.2.13 Table 2-34 2.2.10 Table 2-28 2.2.13 Table 2-34 * 22.2.10 Table 2-28 * Appendix B (example)
R38. Guidance for protecting confidentiality	Appendix Questionnaire 2.2.1 Table 2-10 Appendix F Training Materials 2.2.4 Table 2-16 2.2.6 Table 2-20 * 2.2.9 Notes * add note to remind of confidentiality 2.2.12 Table 2-32 2.2.14 Summary 2.2.15 Summary
R39. Guidance for retention of records	2.3.3

Table H-1. Traceability Matrix to SEI CAF, continued

continued on next page

Table H-1 Notes

Items preceded by "" are suggestions to satisfy this requirement.

There is an implicit assumption which should be explicit (experience, "how to").

**Item where SAM deviates acceptably from CAF by re-allocating requirement

Appendix I: References

Introduction

This appendix provides the references for documents cited within the SAM.

Reference List

[SECMM] Bate, R., Garcia, S. et al. *A Systems Engineering Capability Maturity Model, Version 1.0*, (SECMM-94-04|CMU/SEI-94-HB-04). Pittsburgh, PA: Carnegie Mellon University, Software Engineering Institute: December 1994.

[CAF] Masters, S. *CMM Appraisal Framework, Version 1.0,*" (ESC-TR-95-001|CMU/SEI-95-TR-001). Pittsburgh, PA: Carnegie Mellon University, Software Engineering Institute: 1995.

Appendix J: SAM Questionnaire

Introduction

This appendix contains the instructions and forms for the SAM questionnaire.

In this appendix

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

Topic	See Page
Instructions for the SAM Questionnaire	A-76
Glossary	A-78
Respondent Feedback	A-81
Site Coordinator Instructions for Distributing Questionnaire	A-82
Questionnaires by Process Area	A-87

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Instructions for the SAM Questionnaire

Purpose

The purpose of this questionnaire is to gather preliminary data on your organization's systems engineering process capability for the upcoming systems engineering appraisal.

Respondent information

Please identify yourself and your project or team, as appropriate.

Name: _____ Date: _____

Project: _____

Questionnaire structure

Following this introduction is a glossary of terms used in the questionnaire.

Following the glossary is a place for you to provide feedback on this questionnaire to the developers of the SE-CMM appraisal method. Please complete this form after you have completed the questionnaire. Your comments drive improvements to the appraisal method and questionnaire.

The body of the questionnaire has three pages of questions for each of the 17 process areas of the Systems Engineering Capability Maturity Model (SE-CMM). Each process area begins with a summary description and a list of its base practices. The base practices are followed by three series of questions (parts 2, 3, and 4), each series addressing a different perspective (performing the work, managing the process, and infrastructure support).

continued on next page

Instructions

Before You Begin

Please read the glossary to become familiar with how specific terms are used in the questionnaire. Different organizations have different internal meanings for common and uncommon terms. The glossary provides a context for you to understand the intended meaning of the terms throughout your appraisal. Then follow these steps for each process area.

Step	Action
1	Read the process area summary.
2	Identify the base practices that are performed on your project with a √ in the "Yes" box. Also indicate "No" or not applicable (N/A). (part 1)
3	If you had no "Yes" answers, please proceed directly to the next process area.
4	Answer the questions that follow (parts 2, 3, and 4) from the perspective of the practices for which you answered "Yes" in part 1.

Table J-1. Steps for Process Areas.

When You Are Finished

Please fill out the Respondent Feedback form. Feel free to comment on both content and format, being as specific as possible. *Thank you for taking the time to fill out this questionnaire.*

Glossary

Introduction

This glossary defines terms used in the questionnaire. It is recommended that you read through theses definitions *before* you begin answering the questions in the questionnaire.

Organizational terms

This table defines how the terms “organization” and “project” are used in the questionnaire.

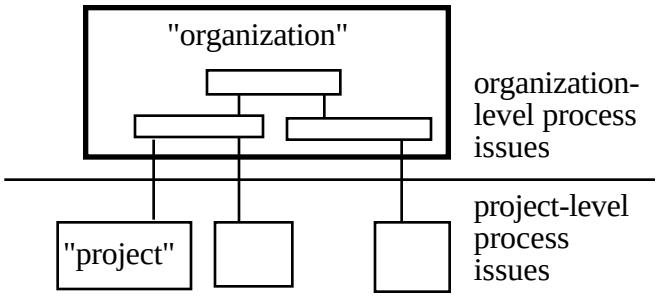
Term	Definition
organization	In the context of the SE-CMM, “organization” refers to the business entity being appraised. That entity should have been defined for you by those who gave you this questionnaire. Specifically, an organization is a unit within a company or other entity, e.g., government agency or branch of service, within which many projects are managed as a whole. (All projects within an organization share common policies at the top of the reporting structure.)
project	In the context of the SE-CMM, a project is an entity within an organization that produces system engineering work products, which are typically associated with a particular deliverable system. The project is the aggregate of effort and other resources focused on developing and/or maintaining a specific product. The product may include hardware, software, and other components. Typically a project has its own funding, cost accounting, and delivery schedule. Some projects are organized around teaming structures. Consult your site coordinator for interpretation of project if your experience appears inconsistent with the above definition. Some aspects of systems engineering process are associated with the project and some with the organization. Even though you may primarily work in one of these contexts or both, answer the questions based on your best knowledge of what is happening in the context in question. 

Table J-2. Organizational Terms.

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Process terms

The process terms in the table below are arranged in the order that they appear in the questionnaire.

Term	Definition
Process area	A set of practices (i.e., process requirements) that address the same purpose.
Process	Any specific combination of machines, tools, methods, materials, and/or people employed to attain specific qualities in a product or service.
Work products	Anything produced by a process. This includes specifications, documents, engineering drawings, etc., not just the product delivered to the ultimate customer. *Delivered products* are those work products that the customer receives. These may also include specifications, interim documents, prototypes, etc., in addition to the final end product (the deliverable system).
Process performance data	Measurements that are used to manage the process used on your project or in your organization. These are measures of the actual results achieved using the process.
This process	The process or processes that your project or organization uses to implement the process area about which you are answering questions.
Organization's standard process (family of processes)	A process described at the organizational level for use by projects in the organization. It may be a family of processes in order to capture the different classes of processes that frequently occur in organizations. It is intended that the *standard process* be tailored into a *defined process* to meet the needs of specific projects.
Defect review	A review of a work product, interim or deliverable, that occurs prior to the release of the work product to the next process step. The review involves the creator of the product and subject matter peers who identify defects in the product that would make it unsuitable for use in the next work process. It is a form of static testing of the work product.

Table J-3. Process Terms.

continued on next page

Process terms, continued

Term	Definition
Process capability	At its simplest, process capability indicates the range of results expected by performing a process. Process capability implies competence. Initially a process is *chaotic*. (In this context, chaotic implies a high degree of variation.) It is *stable* when special causes of variation have been removed, and *capable* when common causes of variation have been reduced to meet customer validated requirements (specification limits). This is the process improvement framework upon which the SE-CMM process dimension is based.
Process and product measures	Note: both work products and the process can be measured. *Product measures* are measurable attributes of a *product*, such as size or number of defects, and generally do not vary over time (i.e., the product measure can be measured at any time and get the same result). *Process measures* are measurable attributes of the *process* used to produce the product, such as resources expended per product or percent rework. (They *must* be measured during the process; after the process has completed, only product measures may be taken.)
Special causes of variation	Special causes of variation are *assignable* to people, places, materials, events, etc. They are causes of variation that are not attributable to the process itself, although they may be attributable to some aspect of its execution.
Common causes of variation	Common causes are causes of natural variation inherent in a process. Removing common causes of variation involves making changes to the process itself.

Table J-3. Process Terms, continued

Respondent Feedback

Respondent information

Please identify yourself and your project.

Name: _____ Date: _____

Organization: _____

Amount of time spent filling out questionnaire: _____

PAs you were given to answer questions about: _____all

If not all, then please list the numbers you were given: _____

_____

Feedback

We would greatly appreciate your comments on the questionnaire. The developers of the SE-CMM appraisal method will use this feedback to improve the SE-CMM, the appraisal method, and the questionnaire. Feel free to comment on both content and format; the more specific, the better. We are specifically interested in the following areas: clarity of instructions, usefulness of the glossary, other terms that need to be defined, structure of the questionnaire, and understandability of the questions. Thank you for your time and input!

Site Coordinator Instructions for Distributing Questionnaire

Introduction

The SE-CMM questionnaire is the first step in a data gathering process designed to provide the managers and practitioners with insight into the organization's systems engineering practices. When determining who should fill out the questionnaire, it is important to choose individuals who will provide answers that represent the entire project/organization.

Time constraints

It typically takes around two hours for an experienced project lead-level systems engineer to complete the entire SE-CMM questionnaire. For a subject matter expert to fill out a single questionnaire typically takes between 5-10 minutes. Questionnaire response time is reduced when the respondents have immediate access to a site coordinator who understands the model/appraisal method, and when the entire questionnaire is answered in one sitting.

Recommended administration approach

To maximize the use of both the site coordinator's and respondents' time, it is recommended that one or two "appointments" be set up in a room large enough to accommodate all respondents with a suitable writing surface, e.g., a large table or several small tables. Respondents are invited to schedule themselves for one of the two appointments. (One is optimal, because then all respondents hear answers to questions together. However, at many sites getting the individuals needed to answer the questions at the same meeting is often difficult.) Before the individuals start filling out the questionnaires, the site coordinator introduces the respondents to the model and appraisal, distributes the questionnaire, and makes clear that the answers are to reflect their individual opinions. He/she also makes clear that the site coordinator is there to clarify terminology and concepts, and respondents are encouraged to voice questions. The site coordinator can then answer to the entire group assembled. The site coordinator also records any questions he/she cannot answer so he/she can contact an SE-CMM facilitator for guidance.

After each respondent is finished, the site coordinator collects the questionnaire and, if not already filled in by respondent, completes the 'time spent' portion of the feedback form.

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Questionnaire distribution table

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 the following table.

Process Area	Primary Respondents	Secondary Respondents
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	• Technical marketing personnel • Proposal personnel • Customer service personnel
07: Verify and Validate System	Systems engineering leads for the projects selected for appraisal	System verification manager or senior test engineers

Table J-4. Questionnaire Distribution Table.

continued on next page

Questionnaire distribution table, continued

Process Area	Primary Respondents	Secondary Respondents
08: Ensure Quality	Senior project-level quality manager or lead (in environments with shared quality leadership responsibility, systems engineering lead for the project)	• 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 J-4. Questionnaire Distribution Table, continued

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Questionnaire distribution table, continued

Process Area	Primary Respondents	Secondary Respondents
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 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 planning, development, and deployment of organization-level training; may be part of an R&D group, training department, or other support structure	Systems engineering leads for the projects selected for appraisal

Table J-4. Questionnaire Distribution Table, continued

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Distribution recommendation	Even though there are other roles called out as primary targets for the questionnaire in certain instances, having the SE leads answer all the PAs provides an overall context of how things appear from the project viewpoint, which can be very valuable. Therefore, it is recommended that the SE leads complete all the PAs whenever feasible.