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IDEAL℠: A User's Guide for Software Process Improvement

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FOR THE COMMANDER

(signature on file)

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About This Guide

Software process improvement (SPI) is a challenging undertaking for any organization. We hope that the guidelines given in this document will help those undertaking a SPI initiative for the first time and also those who are continuing an existing SPI initiative.

Organization of the Guide

We describe the major activities of software process improvement relative to the five phases of the IDEAL[SM][1] model in Chapters 1.0 through 5.0. Chapter 6.0 provides guidance for developing a software process improvement infrastructure and also describes the roles and responsibilities of that infrastructure. The format of Chapter 6.0 (Manage the Software Process Improvement Program) is different from the other chapters because the management and infrastructure activities discussed there are continuous and and not part of the IDEAL model phases. In general, we limit the chapter structure to three levels of detail. Where additional detail is needed it is provided in the appendices:

- Appendix A.0, Components of the Software Process Improvement Infrastructure.
- Appendix B.0, Charters and Templates.
- Appendix C.0, Establish Organization Process Maturity Baseline.

Following these appendices, we provide a glossary (page 215). When we introduce a new term or key phrase in the text for the first time, we print the term or phrase in

[1] IDEAL is a service mark of Carnegie Mellon University.

bold typeface to indicate that it is defined in the glossary. There is also an index on page 219.

Objectives

The objective of this document is to communicate a path of actions that constitute a SPI initiative, based on the experiences the Software Engineering Institute (SEI) has gained while working with its respective government and industry clients. We expect that an organization will tailor the steps outlined in this document to fit its resources, vision and business objectives.

The guide is also based on the work of several projects at the SEI. SEI projects whose work contributed directly or indirectly to the material in this guide include the following:[1] Capability Maturity Model, Software Process Assessment, Software Capability Evaluation, Organization Capability Development, Software Process Measurement, and Software Process Definition.

Acknowledgments

IDEAL: A User's Guide for Software Process Improvement is the successor to the *Software Process Improvement Roadmap*,[2] which was a collaboration between the SEI and the Hewlett-Packard Company.

The information in this guide is based on the application of the IDEAL model to software process improvement practices and the lessons learned from these experiences. Concepts in the guide were proven with the SEI client base within the Department of Defense and internal software process improvement activities at Hewlett-Packard.

The author gratefully acknowledges the contributions of the many people without whom this guide would not have been possible.

Thanks go to Bill Peterson, Steve Masters, and Donna Dunaway for their helpful comments and suggestions.

1. The names given here reflect the names of the projects at the time the work was done. Names have changed since then.
2. McFeeley, Robert S.; McKeehan, David W.; & Temple, Timothy. *Software Process Improvement Roadmap* (SEI-94-SR-2) is a limited distribution document not approved for public release.

For a list of the important published findings in the field of software process improvement, please refer to the *SEI Annotated Listing of Documents*.[1]

The guide was edited, formatted, and indexed by Bob Lang at the SEI.

Suggestions for Improving the Guide

We would appreciate any suggestions you may have for how this document could be improved. Send comments to

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Introduction

Overview

This document describes a software process improvement (SPI) program model, IDEAL, which can be used to guide development of a long-range, integrated plan for initiating and managing a SPI program. The purpose of this document is to provide process improvement managers with a generic description of a sequence of recommended steps for SPI.

IDEAL Model

The model shown in Figure Intro-1 on page 2 depicts five phases of a SPI initiative, which provide a continuous loop through the steps necessary for SPI. It is important to note that the length of time it takes to complete a cycle through the IDEAL model will vary from organization to organization. Organizations will find, depending on the resources they are able to commit to the SPI program, many activities that can be pursued in a parallel fashion. There will also be instances of some parts of the organization pursuing activities in one phase of the model while others are pursuing activities in a different phase. In practice the boundaries between the phases of IDEAL are not as clearly defined as shown in the model.

It is also important to note that the infrastructure set up to accomplish SPI will play a significant role in the success or failure of a SPI initiative. The value that the infrastructure brings to a SPI initiative, its understanding of its roles and responsibilities, cannot be underestimated.

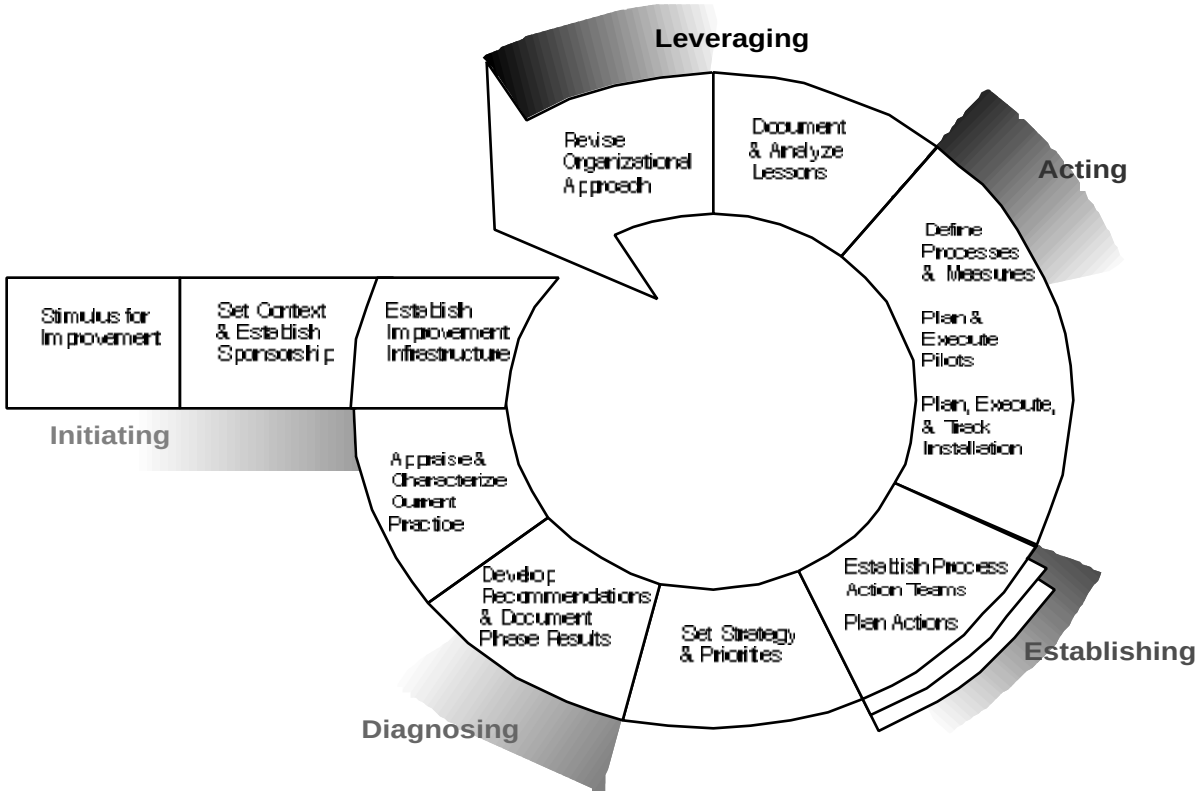

Figure Intro-1: The IDEAL Model

Initiating Phase

The Initiating phase of the IDEAL model is the starting point. Here is where the initial improvement infrastructure is established, the roles and responsibilities for the infrastructure are initially defined, and initial resources are assigned. In this phase, a SPI plan is created to guide the organization through the completion of the Initiating, Diagnosing and Establishing phases. Approval for the SPI initiative is obtained along with a commitment of future resources for the job ahead.

The general goals of the SPI program are defined during the Initiating phase. They are established from the business needs of the organization and will be refined and made specific during the Establishing phase of IDEAL.

The initial infrastructure to support and facilitate SPI will be established during the Initiating phase. Two key compo-

nents are typically established, a management steering group (MSG) and a software engineering process group (SEPG). Also during the Initiating phase, plans are made for communicating the start of the SPI initiative, and it is suggested that organizational assessments be performed to determine the readiness of the organization for a SPI initiative.

Diagnosing Phase

The Diagnosing phase of the IDEAL model starts the organization on the path of continuous software process improvement. This phase lays the groundwork for the later phases. In this phase, the SPI action plan is initiated in accordance with the organization's vision, strategic business plan, lessons learned from past improvement efforts, key business issues faced by the organization, and long-range goals. Appraisal activities are performed to establish a baseline of the organization's current state. The results and recommendations from appraisals and any other baselining activities will be reconciled with existing and/or planned improvement efforts for inclusion into the SPI action plan.

Establishing Phase

During the Establishing phase, the issues that the organization has decided to address with its improvement activities are prioritized; strategies for pursuing the solutions are also developed. The SPI action plan draft will be completed in accordance with the organization's vision, strategic business plan, lessons learned from past improvement efforts, key business issues facing the organization and long-range goals.

During the Establishing phase, measurable goals are developed from the general goals that were defined in the Initiating phase; these measurable goals will be included in the final version of the SPI action plan.

Metrics necessary to monitor progress are also defined, and resources are committed and training provided for the technical working groups (TWGs). The action plan developed will guide the SPI activity as it addresses the priori-

tized findings and recommendations from the Diagnosing phase. Also during this phase, tactical action plan templates are created and made available for the TWGs to complete and follow.

Acting Phase

In the Acting phase of the IDEAL model, solutions to address the areas for improvement discovered during the Diagnosing phase are created, piloted, and deployed throughout the organization. Plans will be developed to execute pilots to test and evaluate the new or improved processes. After successful piloting of the new processes and determining their readiness for organization-wide adoption, deployment, and institutionalization, plans to accomplish the roll-out are then developed and executed.

Leveraging Phase

The objective of the Leveraging phase is to make the next pass through the IDEAL model more effective. By this time, solutions have been developed, lessons have been learned, and metrics on performance and goal achievement have been collected. These artifacts are added to the process database that will become a source of information for personnel involved in the next pass through the model.

Using this collected information, an evaluation of the strategy, methods and infrastructure used in the SPI program can be performed. By doing this, corrections or adjustments to the strategy, methods, or infrastructure can be made prior to the start.

Some questions that should be asked include: Has the infrastructure (MSG, SEPG, TWGs, etc.) performance been appropriate? Have the methods employed by the TWGs in their solution development activities been satisfactory? Have the SPI communications activities been sufficient? Does the sponsorship for SPI need to be reaffirmed? Does another baselining activity need to be performed? The reentry point into the IDEAL model for the next cycle is highly dependent on the answers to questions such as these.

Applying the Model

When applying the IDEAL model it should be remembered that there are two components to a software process improvement activity, a strategic component along with a tactical component.

The strategic component, based on the organizations business needs and drivers, will provide guidance and prioritization of the tactical activities.

Figure Intro-2 on page 5 shows a two dimensional view of the application of the IDEAL model. This guide is intended to address these two operational levels within a process improvement initiative:

- A strategic level, in which there are processes that are the responsibility of senior management.
- A tactical level, in which processes are modified, created and executed by line managers and practitioners.

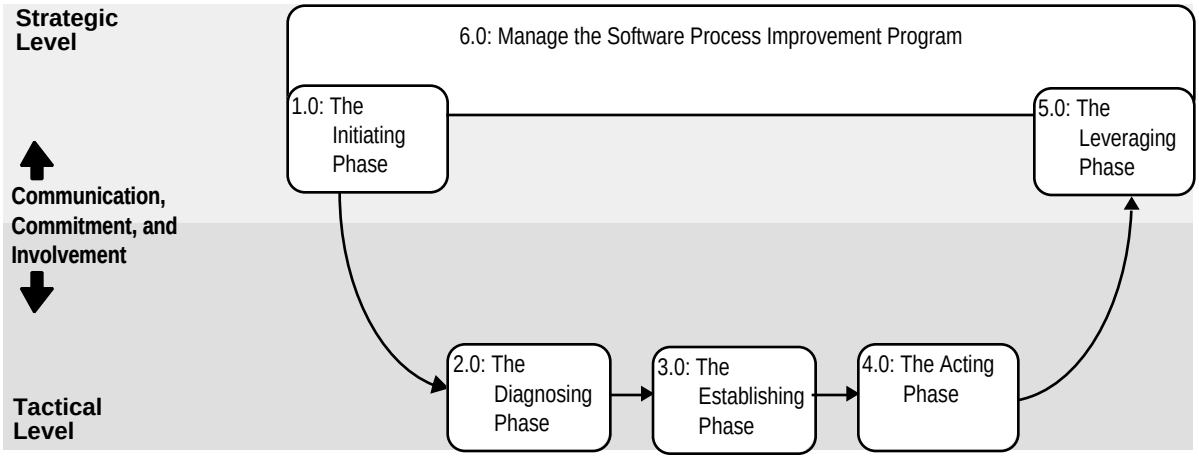

Figure Intro-2: Two-Dimensional View of a Process Improvement Activity

The flow depicted in Figure Intro-2 should be viewed as a continuous flow. As improvement activity is completed, both the strategic-level and tactical-level activities return to the Leveraging phase, where management commitment is reaffirmed, new baselines are planned, and strategy may or may not be redirected.

Structure of the Guide

This document describes the 5 phases of the IDEAL model, shown in Figure Intro-1 on page 2. These phases of the IDEAL model contain a set of tasks that are executed during the implementation of a SPI program. A sixth activity, that of providing management oversight to the program, is described in the final chapter of this guide. Descriptions of these activities make up the remaining six chapters of this guide. The IDEAL phases in Figure Intro-1 match the chapters within the document.

The activities in the guide are listed and briefly summarized in the following table:

Activity Name	Activity Purpose	See Page
1.0: The Initiating Phase	Learn about process improvement, commit initial resources, and build process infrastructure.	11
2.0: The Diagnosing Phase	Establish current levels of process maturity, process descriptions, metrics, etc. Initiate action plan development.	53
3.0: The Establishing Phase	Establish goals and priorities, complete action plan.	67
4.0: The Acting Phase	Research and develop solutions to process problems. Expand successful process improvements to entire organization.	93
5.0: The Leveraging Phase	Prepare for the next cycle through the IDEAL model. Apply the lessons learned to refine the SPI process.	127
6.0: Manage the Software Process Improvement Program	Provide oversight to the improvement projects and resolve issues.	141

In general, the chapter structure has been limited to three levels of detail. Additional detail is provided in the appendices.

The guide is intended to be general and does not presuppose or force any particular methodology. For a list of sources that can be used to support and help ensure a successful SPI program, see the Software Engineering Institute (SEI) *Annotated Listing of Documents*.[1]

Purpose

This document is intended to provide an organization with a guide to establishing and carrying out a SPI program. It is written primarily from the point of view of the organization setting up the program, not from an external consultant's or solution provider's point of view. The expected users are the champions of SPI, mainly SPI program managers. Other users who would benefit from review of the document include senior managers, line managers, and individuals who are interested and/or have a stake in improving the software development capability of the organization.

Some Assembly Required: One Size Does *Not* Fit All!

This guide is organized in a best-case scenario. There will always be real-world events that prevent organizations from following a set sequence in process improvement. SPI managers must tailor the guide to their particular situation. The sequence presented here is recommended because as baselines are completed, the SPI managers and practitioners will come under increasing pressure to produce plans, actions and results. Because it will be difficult to allocate time for organizing and planning later in the process, managers must make sure that time is allocated up front to accomplish these activities. Clear understanding of what will be done, why, by whom, and when it will be done will be invaluable for maintaining the momentum of a SPI program.

This guide recommends that 1-3% of an organization's personnel be applied to managing and executing SPI. Given these recommendations, the guide is intended to be used by organizations that are large enough to assign at least one

1. Available from Research Access, Inc., 800 Vinial Street, Pittsburgh, PA 15212. Phone: 1-800-685-6510. FAX: (412) 321-2994

full-time and one part-time person to SPI. At least two people are needed to provide synergy and backup in activities. Smaller organizations, those with 30 to 50 people or so, will require a strong commitment to sustain a SPI effort. Organizations of this size have successfully conducted SPI programs. Scale issues need to be addressed for organizations of this size, as they are probably not complex enough to warrant the typical SPI infrastructure. Regardless of size, it is recommended that at least one person be applied full time to facilitate and execute SPI.

On the other hand, process groups in large organizations can become too bureaucratic and could lose contact with the technical staffs they are designed to help. Large organizations (more than 600 people) should consider dividing process groups into the corporate organizational model described in 6.2: Organizing the SPI Program beginning on page 146.

Organization vs. Corporate Considerations

This guide is primarily focused on organization-specific activities. To be successful, such activities do not require a corporate program. A corporate program cannot fulfill all (or many) of the functions of an organization program:

- It is too far away.
- There is too much “normalization.” That is, the organization subcultures are too different for a single set of practices and solutions.
- There are never enough resources (resources would be spread too thin).

However, a corporate program can be beneficial in some areas; the guide does include those activities for which a corporate office would be responsible. Within a corporation that is made up of a number of separate organizations, there may and probably will exist a hierarchy of SPI programs. The corporate program would perform activities in its corporate context, including

- Establishing infrastructure and links to support and coordinate the organization programs.
- Looking outside the corporation for “process reuse.”
- Supporting organizational activities through resources, common practices, communication, etc.
- Spreading findings, practices, information, etc., across a wider base within the corporation.
- Acting as a focal point for outside process improvement influences, such as those from the SEI, ISO 9000, etc.

Plans

Within this guide there is some discussion around the plans that are developed to guide and provide focus to the SPI program. This guide refers to some of the different types of plans that can be used during the SPI initiative. Depending on the size, culture and structure of an organization it may require more, or possibly fewer, plans to provide the SPI guidance required.

SPI Plan

This plan is a high level plan with broad goals that outlines the SPI initiative that the organization will be following. Creation of this plan is started in the early part of the Initiating phase of the IDEAL model and carries the organization through the completion of the baselining activities in the Diagnosing phase.

Responsibility for developing this plan is shared among the discovery team, the management steering group and the software engineering process group. Senior management will have approval responsibility for this plan.

SPI Action Plan

This plan is created from input obtained from the baselining activities that take place during the Establishing phase. Information gained from the baselining activities, combined with input from the organizations vision and business needs are used to create the action plan that will guide the SPI effort for the next few years.

The SPI action plan contains the areas of improvement that will be addressed during the SPI activity, their rela-

tive priorities, and a description of the process that will be followed to accomplish the improvement. This action plan is usually developed by the MSG with input and help from the SEPG.

Tactical Action Plans

These plans will provide guidance to the TWGs that are formed to address a specific improvement activity from the SPI action plan. Usually there is a template of the format for this plan, partially completed by the SEPG and given to the TWG at its start up. The TWG will then complete the remainder of the template and submit the completed plan to the MSG for approval.

Pilot Plans

Pilot plans are generated from an existing template supplied to the TWG by the SEPG. It is a plan that is used to guide the first installation of a potential solution to one of the findings from the baselining activities. This plan is completed in conjunction with the organization component that has agreed to pilot the solution. It is approved by the management of the organization that is to receive the pilot installation.

Deployment or Rollout Plans

This plan is developed after successful installation of the pilot solution, applying any lessons learned from the pilot activity. It is used to guide the deployment of the solution organization wide. It is approved by the MSG.

Communications Plans

These plans are developed and updated throughout the SPI activity to keep the organization informed of the SPI activities. Keeping the organization aware of what is happening will contribute to achieving buy in and sponsorship for the SPI program.

1.0 The Initiating Phase

Overview

This is the initial step in the IDEAL model. In this phase, the organization's **senior management** first understands the need software **process** improvement (SPI), commits to a SPI program, and defines the context for SPI.

This step is similar to the definition of a new system. An initial high level SPI plan and schedule for initial SPI tasks are developed, major functional elements defined, and key interfaces and requirements are also defined and agreed upon. This high level plan will guide the organization through completion of the Establishing phase, at which time a SPI action plan will be completed. Typically a **discovery team** will be formed to explore the issues and to develop a **SPI proposal** to senior management. Following the approval of the SPI proposal, the infrastructure for launching the SPI program will be formed.

The organization needs to decide how it will organize its improvement efforts, who will be involved, both at the **practitioner** and management levels, and how much of those people's time will be allocated to the effort. Based on these initial decisions, the charter and staffing for the **management steering group (MSG)**, **software engineering process group (SEPG)**, and other organizational entities can be completed. These entities then develop working procedures, plans, and schedules to steer the organization through the process improvement program. Appendix A.0 on page 167 further defines the organizational infrastructure for SPI.

Planning is very important in this step. Once the baselining efforts (in the Diagnosing phase) are under way, the MSG and SEPG will come under increasing pressure to produce. It is usually very difficult to allocate enough time

at that point to organizing the effort. A clear understanding by both the MSG and the SEPG of what will be done, how, and when, before the baselining activities, is essential for setting the stage for effective work afterwards.

Purpose

- Recognize and understand the stimulus for improvement.
- Set context and establish sponsorship for the SPI program.
- Launch the SPI program by building an understanding and an awareness of the costs and benefits.
- Commit the resources necessary.
- Establish the initial infrastructure needed to implement and manage the program.

Objectives

- Build initial awareness, skills, and knowledge to start SPI.
- Gain an understanding of what commitment is necessary for successful SPI.
- Determine readiness to proceed.
- Create a proposal for a SPI program, outlining the needs for SPI, the scope of the program, and resource requirements.
- Recommend a schedule and infrastructure to manage the program.
- Plan for and commit to the next steps.

Education/Skills

Training and skill development for the Initiating phase is shown in the following table.

Because the organization is probably just starting to learn about SPI and how to go about launching a SPI program, this step requires substantial education and training. The table below shows the breakdown of education and training needs.

Education/Skills	MSG	SEPG	Discovery Team	Line Managers	Practitioners
Planning	X	X	X		
Team Development	X	X			
Managing Technological Change	X	X		X	
SPI Benefits	X	x	X	X	X
Vision setting	X	X	X	X	
Consulting skills		X			
CMM[SM1] for software	X	X	X	X	X
SPI processes	X	X		X	

[1.] CMM is a service mark of Carnegie Mellon University.

Commitment

Commitment and sponsorship are key. Without strong, informed, and steadfast commitment and sponsorship from senior management, the effort is doomed from the start. If the **champion** cannot obtain the level of commitment and sponsorship described in this guide, the effort is better deferred until the commitment and sponsorship are present.

Senior management's initial commitment is to

- allow the discovery team to form and to explore the issues and develop a SPI proposal
- provide the discovery team with the business need for process improvement.
- provide the discovery team with the resources necessary to develop the proposal

This is followed by committing to implement the SPI proposal and backed up by assigning resources to the SEPG and creating and resourcing other necessary SPI infrastructure elements.

The line management **stakeholders** also must

- commit time and effort to participate in SPI
- form and commit time to the MSG
- form and commit resources to the SEPG
- plan to manage the SPI program and develop a strategy in the steps that follow
- commit time for practitioners to participate on **technical working groups (TWGs)**

Prospective SEPG members also must commit time to work on the SEPG and understand that this commitment could result in a substantial change in their work assignments within the organization.

Communication

The discovery team will regularly communicate the results of its work to the entire organization and to key organization stakeholders and senior management in particular. These communications take the form of general information exchanges about what the team is learning and what is happening, along with specific requests for decisions and commitment from senior management.

Senior management must communicate the business objectives, goals, and rationale for the SPI program, and the urgency of those efforts. They must show to the organization active commitment to the effort.

Once the infrastructure is formed, the MSG and SEPG must maintain a steady flow of communication throughout the organization about what is happening.

In the absence of any specific information, people tend to assume the worst. A change effort of this magnitude causes substantial fear and uncertainty throughout the organization; resistance to change will show up for a variety of reasons. Regular and effective communications will alleviate

some of that concern. Developing and following a communications plan will pay dividends.

Entry Criteria

Organizations may initiate a SPI program because of some disaster or impending disaster in their business that includes their software capabilities, or through a desire to maintain or improve their competitive edge through the quality and productivity of their software processes. Usually there are one or more champions of SPI who lobby to get an effort started and investigate ways to launch a program.

The key entry criteria are

- Critical business needs to improve software development processes exist and are fully understood.
- Organization champion(s) for SPI are identified.

Exit Criteria

Experience has shown that there are some key factors that will enhance the chances for a successful SPI program. Having the correct levels of sponsorship for the program, developing an infrastructure staffed with respected members from the organization, developing a communications plan, and implementing an incentive and recognition program for SPI will return large benefits.

- The initial SPI infrastructure has been established and is reinforcing sponsorship and promoting SPI concepts and activities.
- Organization has linked the SPI initiative with the organization's business strategy.
- Initial **organization communication plan** for the SPI initiative is completed.
- Recognition program established to publicly demonstrate rewards for SPI results.
- An initial, organization-specific SPI plan has been created to guide the program through the Initiating, Diagnosing and Establishing phases of the IDEAL model.

See Figure 1-1 on page 17 for a pictorial representation of the tasks associated with the Initiating Phase of the IDE-AL model.

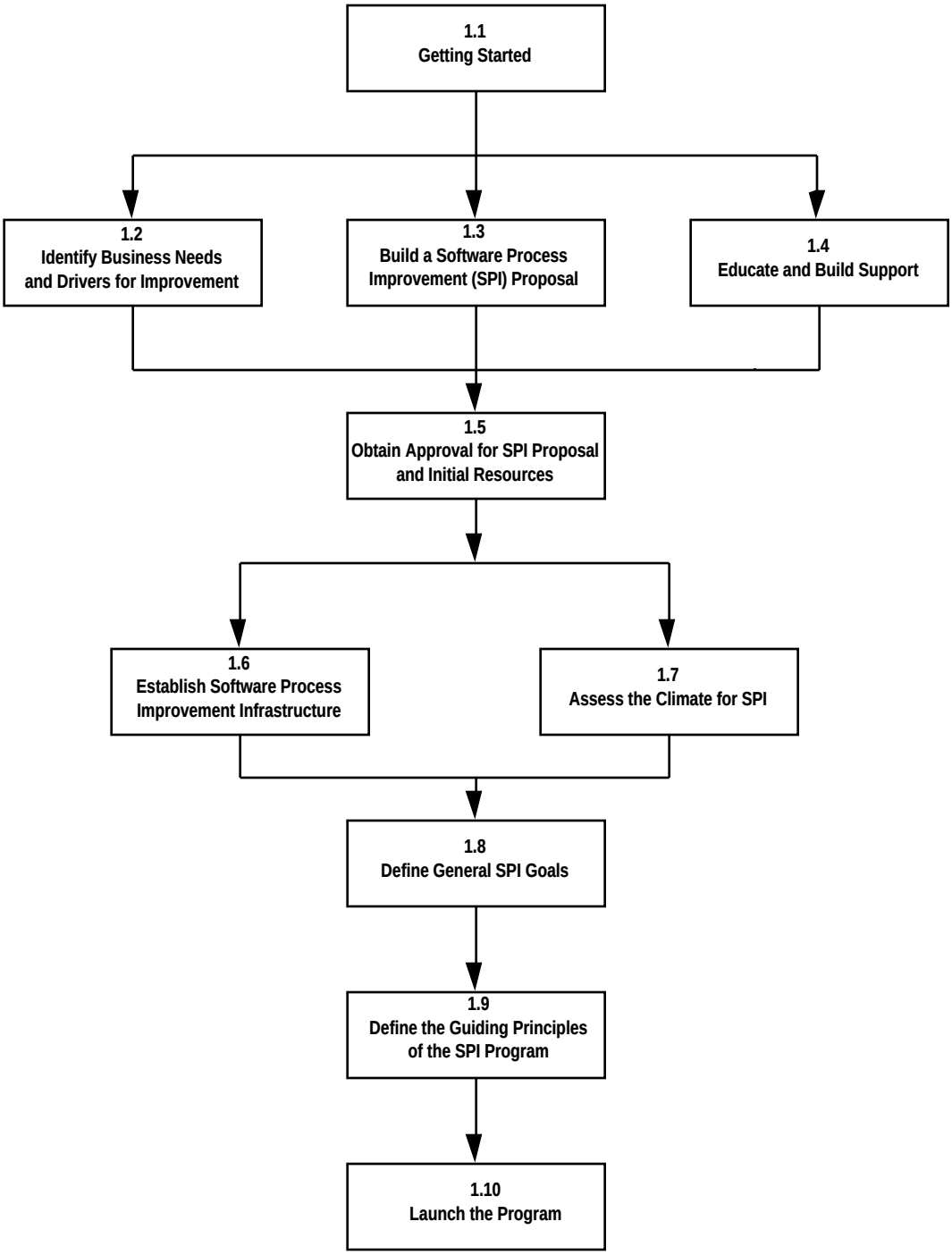

Figure 1-1: Process Flow for Initiating Phase

Tasks

The tasks for the Initiating phase are shown in the table below.

1.1 Getting Started

Purpose

The purpose of this activity is to organize a discovery team to put together a proposal to management for launching a SPI program. This team will gather information about

- current business needs, organizational policies, and regulations that may affect a SPI program
- other change programs or similar initiatives that exist in the organization or that may be planned for the future
- ways to run a SPI program

The team will then select a specific approach.

Objectives

- Identify departments that will be stakeholders in a SPI program.
- Evaluate and select an approach to conducting the SPI program.
- Identify business needs.
- Identify approaches to SPI.

Entry Criteria

- Critical business issues driving the need for process improvement are identified.
- A desire to improve software development processes is present.
- There is an organization champion(s) for SPI. The champions may come from anywhere in the organization, including practitioners and middle or senior management. There may be several champions within the organization or only one.

Exit Criteria

- The SPI discovery team exists.
- Existing and future initiatives, policies, and regulations that will affect the creation of a SPI program have been identified and analysis of their effect, either as barriers or leverage points has been accomplished.

- An approach to launching and conducting a SPI program has been selected and support agreements have been established. (This guide is such an approach, but it requires tailoring and customizing to the local environment.)

Tasks

- Form a discovery team.
  - Select a SPI champion with the necessary leadership skills to lead the team and do early planning and sponsorship building.
  - Select representatives from the stakeholder groups to be involved in the development of the SPI plans.
- Identify the SPI climate for change.

  Identify current policies, regulations, and initiatives that will support or impede the launching of a SPI program. For example, a company may have a policy regarding annual management training; may be subject to government agency regulations, such as the Food and Drug Administration; or may have an initiative to achieve ISO 9001 certification. These all may affect a SPI program.
- Get information on how to do SPI.
  - Identify different approaches and support groups.
  - Select an approach that fits the needs and environment of the organization best.
  - Establish consulting and training support for the approach selected.

1.2 Identify Business Needs and Drivers for Improvement

Purpose

The purpose of this step is to understand, from a management perspective, the key business needs driving the requirement for a SPI program.

SPI champions usually have many good reasons why an organization should launch a SPI program, but their reasons are rarely couched in business terms or aligned with the organization's business needs. This activity will establish the need for a SPI program in management business terms, aligned with current business needs.

Objectives

- Identify key business needs that drive a requirement for SPI.
- Link SPI program to business needs.

Entry Criteria

- The SPI discovery team exists.
- Senior management has articulated the organization's business strategy.

Exit Criteria

- The key business needs have been defined and links established as drivers to a SPI program.
- High level description of the desired state of process improvement for the organization has been documented.

Tasks

- Collect business needs.
  - Review current vision statements and SPI business focus.
  - Collect any current needs identification documents.
  - Interview key management stakeholders.

- Review needs to determine those that can be fully or partially satisfied through a SPI program.
- Define how the SPI program can satisfy the business needs.

1.3 Build a Software Process Improvement (SPI) Proposal

Purpose

The purpose of this step is to build a proposal for senior management that will explain what the SPI program is, why it should be initiated, what it will cost, how long it will take to see results, and what approach is selected. The proposal should answer the questions, "What do we want to do?" and "Why do we want to do it?"

This will lead to the next management decision point, at which management decides whether or not to go ahead with the SPI program (see Step 1.5 on page 28).

Objectives

Develop and deliver a SPI proposal.

Entry Criteria

- The SPI discovery team is formed and in place.
- Existing initiatives, policies, and regulations that will affect the creation of a SPI program have been identified.
- An approach to launching and conducting a SPI program has been selected and SPI consulting support agreements established.
- Business needs and drivers for the proposal are defined.

Exit Criteria

- The proposal is completed and ready to be delivered.
- Draft of an organization communication plan has been developed.

Tasks

- Identify key management stakeholders to
  - get inputs for the proposal
  - send draft proposal to them for review and comment

- Come to consensus with senior management on the problem(s) addressed by the SPI program proposal.
- Establish goals and objectives for the improvement program, ensuring consistency with business objectives and critical business needs previously identified. See Step 1.8 on page 49.
- Initiate development of a vision of the desired state of the organization's process maturity.
- Identify and communicate SPI resource expectations.
- Determine scope.
    - Which departments (R&D, marketing, manufacturing, quality, etc.) will be included
    - What kinds of software (product, embedded, mission, support, etc.) will be included
- Determine organizational structure for managing and coordinating the SPI program, including roles and responsibilities of
    - senior management
    - organization support groups
    - corporate support groups
    - SEPG (determine membership based on scope of improvement program)
    - MSG (determine membership based on scope of improvement program, funding sources, and management control requirements)
    - other entities
- Develop high-level plan.
    - Develop initial high-level activities and schedule through the Establishing phase.
    - Determine basic resource requirements (people, training needs, travel funds, equipment, consultants), primarily for the SEPG, key managers, and staff in line organizations and expected baselining teams.

- Determine benefits to the organization, such as business value (include return on investment if appropriate), improved capabilities, morale.
- Write the proposal to senior management.
- Conduct reviews to refine draft proposal with key stakeholders.
- Initiate creation of organization's SPI communication plan.

1.4 Educate and Build Support

Purpose

The purpose of this activity is to create awareness, set expectations, and build support for the SPI program across as much of the organization that will be affected by the SPI program as possible. This activity starts early and continues throughout the entire program, adjusting the type and level of information presented to match the current phase and level of activities.

The intent is to answer the question, "What is going on and why are we doing this?" Support is built by involving the people affected by the program in the early, defining parts of the program when they can more easily make a difference and increase their stake in the outcomes.

Objectives

- Communicate the business need for SPI to the organization.
- Communicate the approach that the organization will be taking for the SPI initiative.
- Introduce and involve key stakeholders in communicating and forming the SPI program.

Entry Criteria

- The SPI discovery team is formed and in place.
- Existing initiatives, policies, and regulations that will affect the creation of a SPI program have been identified.
- An approach to launching and conducting a SPI program has been selected and SPI program support agreements established.

Exit Criteria

- Organization SPI communication plan is completed.
- Briefing kits for communications sessions are completed.
- Messages that must be communicated at this point in the program have effectively reached their audiences.

There is no real exit from this activity, as the need to educate and build support for process improvement continues throughout the program.

Tasks

- Build (or obtain) a series of briefings that can be tailored to various organization components covering what the effort is all about, why it is being initiated, how it will affect the audience, and what the desired outcomes are.
- Develop briefings to cover
  - senior managers and their staff
  - software managers and their staff
  - **software practitioners**
  - other interested parties
  - corporate senior managers (if applicable)
- Enlist key stakeholders to deliver briefings where possible or appropriate.
- Brief organization in as many different forums as possible.
  - Establish dialogues with key stakeholders during briefings to help form the SPI program.
  - Follow up with key stakeholders to get feedback and buy-in.

1.5 Obtain Approval for SPI Proposal and Initial Resources

Purpose

Present the SPI proposal to senior management and get their approval and allocation of time and resources necessary to launch the SPI program.

There may be some iteration from Step 1.1 on page 19 through this step (1.5) until agreement is reached on the proposal and resources to continue with the SPI initiative, or to abandon the SPI initiative if agreement cannot be reached.

Objectives

- Obtain approval and resources from senior management and buy-in from other key stakeholders.
- Obtain agreement to establish MSG.
- Obtain approval for resources for SEPG.
- Obtain senior management time participation in follow-on activities (MSG, assessing climate, launching SPI, etc.).

Entry Criteria

- Business rationale for establishing a SPI program is clear.
- The proposal is completed and ready to be delivered.

Exit Criteria

- Proposal approved.
- Resources allocated.
- Organization communication updated.
- or
- Proposal rejected and program cancelled.

Tasks

- Present the proposal to the key organization stakeholders and senior management.
- Obtain approval of the proposal.

- Allocate initial resources to begin work (primarily the MSG and SEPG).
- Establish funding strategy (identify who is responsible for providing and managing what resources).
- Budget for needed resources.
- Find/obtain/distribute resources, including senior management time to participate in follow-on activities.
- Update the organization communication plan.

1.6 Establish Software Process Improvement Infrastructure

Overview

To effectively manage the SPI program, an infrastructure must be in place or created. The elements of the infrastructure must have clearly defined duties and responsibilities along with authority to properly ensure the success of the SPI program. Appendix A.0 on page 167 describes the process improvement infrastructure in more detail.

The primary purpose for establishing an infrastructure for a SPI program is to build the mechanisms necessary to help the organization institutionalize continuous process improvement. The infrastructure established with any SPI program is critical to the success of that program. A solid, effective infrastructure can sustain a developing SPI program until it begins to produce visible results. A good infrastructure can mean the difference between a successful SPI program and a failure. Unsupported SPI programs can become isolated and die out during periods of stress and tension within their organizations.

Infrastructure concepts apply to both local (site) SPI programs and to corporate programs that consist of many different sites, each running its own local SPI program. When the individual SPI programs are a part of a larger organization, there are activities that can be done and mechanisms that can be established that will help ensure that the individual programs

- survive and are effective
- provide economies of scale with reduced site costs
- enhance sharing of lessons learned across multiple sites

The infrastructure will validate the program and lend credence to the efforts. The infrastructure will guide and monitor the SPI program and facilitate allocation of resources. The infrastructure will also interact with external groups

to maintain an awareness of the state of the practice relating to process improvement.

When establishing the SPI infrastructure, the size, structure, and culture of the organization undertaking the SPI must be considered. This along with any geographic considerations will guide the creation of the SPI infrastructure so that management's view of the SPI program is absolutely clear.

At the core of the improvement infrastructure is the SEPG that facilitates the SPI program. There should also be a local MSG to advise the SEPG and monitor its efforts. For larger organizations that span multiple sites, or for efforts that span several organizations, a representative from each of the SEPGs or MSGs should meet to coordinate process improvement activities across several SEPGs.

In very large organizations, there should be an **executive council** (EC) to deal with strategy and direction for the organization's SPI program. Other components of the infrastructure, TWGs, sometimes known as process action teams (PATs), will come and go, existing for finite periods of time to accomplish their specific goals. These different entities are further described in Appendix A.0 on page 167, which also includes sample charters for each entity.

SPI is a significant undertaking for any organization, and it is almost impossible to accomplish anything without a supporting infrastructure. The management infrastructure will do a lot of things for the SEPGs and TWGs that are on the front lines trying to accomplish process improvement.

The infrastructure can

- provide resources when they are needed
- provide counseling about the direction, scope, and speed of the effort
- remove roadblocks so the SPI program proceeds smoothly

Purpose

- Maintain visibility for the SPI program.
- Facilitate and encourage information sharing.
- Capture and retain lessons learned and improvements developed.
- Provide a support resource.

Figure 1-2 on page 33 shows these elements as they support SPI.

Objectives

- Establish the infrastructure.
- Start ongoing infrastructure activities:
  - Facilitate the SPI program.
  - Advise and monitor the efforts of the SEPG.
  - Coordinate process improvement activities.
  - Provide visible and effective sponsorship for the SPI program

Entry Criteria

SPI proposal approved and resources allocated.

Exit Criteria

- Infrastructure defined in terms of specific people, organizational entities, roles and responsibilities, and interfaces.
- Infrastructure charters created.
- Infrastructure in place and operating.

Although the task of establishing the infrastructure has a definite exit, many of the activities that are begun in this task start continuous, ongoing activities that last for the life of the SPI program.

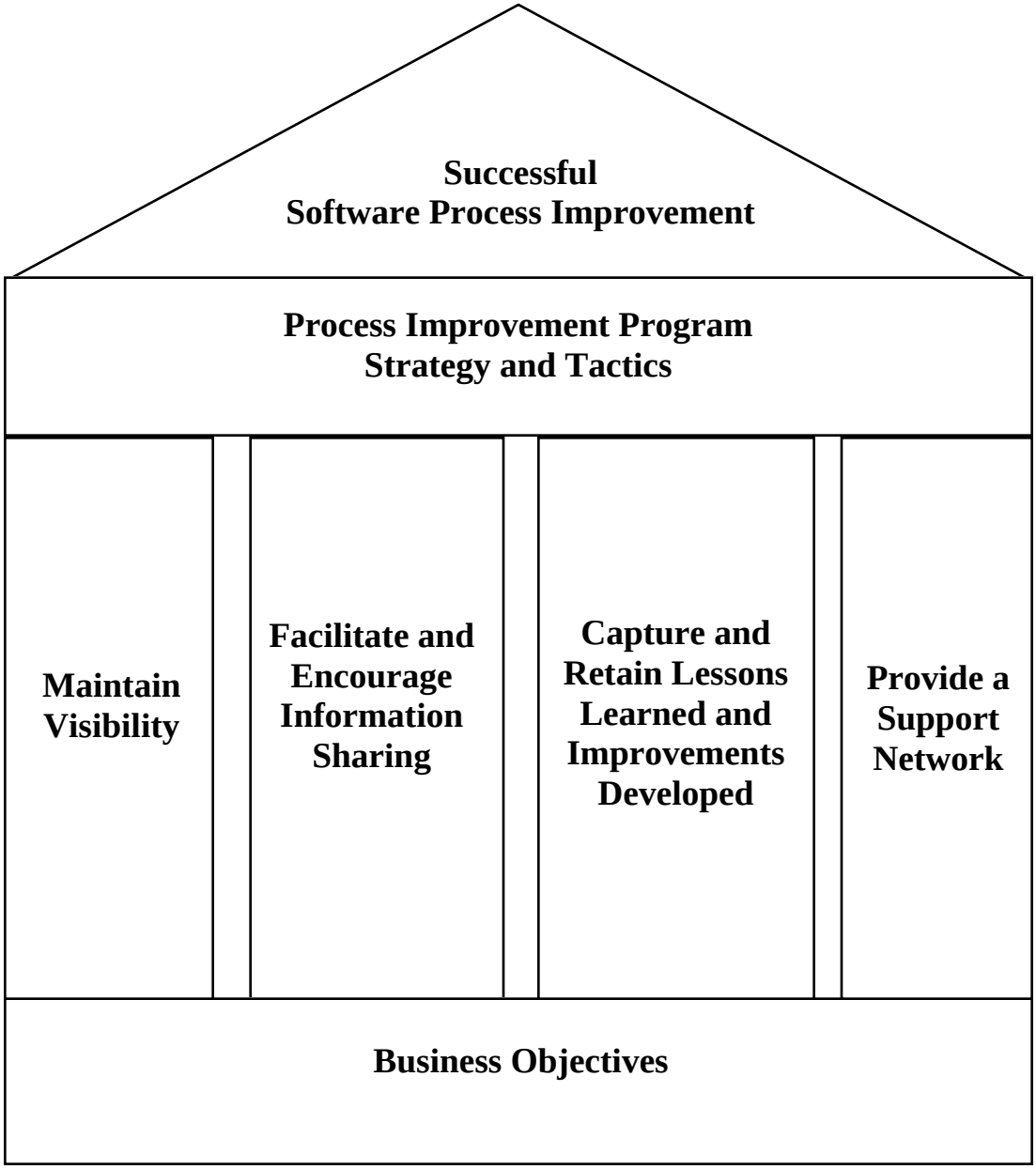

Figure 1-2: Successful Process Improvement

Subtasks The subtasks for this step are shown in the table below.

1.6.1 Establish Management Steering Group (MSG)

Purpose

The purpose of establishing an MSG is to assign project responsibility for the SPI program. The MSG is essentially the project manager for SPI. It provides sponsorship to the effort, arranging for resources as necessary to support the effort. It also monitors the progress of the SPI program and provides guidance and corrective actions as necessary to keep the SPI program linked to the **organization vision** and business needs.

If a similar group already exists, revise/expand their charter to reflect this new responsibility. Membership is selected from the organizations **line management**. See Appendix A.0 on page 167 for more information on the various infrastructure entities and their definitions.

Objectives

Create the infrastructure component that will provide management oversight and guidance to the SPI program.

Entry Criteria

SPI proposal approved.

Tasks

- Select members, chairperson.
- Define roles and responsibilities.
- Define relationship with the SEPG, TWGs and other parts of the organization, including reporting requirements.
- Develop/revise charter for MSG.
- Conduct team building for MSG (and between MSG and any other entities defined).
- Develop process to provide for succession and member replacement.

Exit Criteria

- MSG members selected.
- MSG charter developed and approved.
- MSG leader appointed.

1.6.2 Establish Software Engineering Process Group (SEPG) (Responsibility of MSG)

Purpose

The purpose of establishing an SEPG is to assign responsibility for facilitation and coordination of the SPI program. The SEPG is not the implementor of SPI but plays the role of facilitator, guiding the process improvement activity.

If a similar group already exists, revise/expand their charter to reflect this new responsibility. Membership is selected from the organizations practitioners. See Appendix A.0 on page 167, for more information on the various infrastructure entities and their definitions.

Objectives

- Create the infrastructure component that will facilitate and guide the SPI activities.
- Select qualified personnel for membership.

Entry Criteria

SPI proposal approved.

Tasks

- Determine SEPG member qualifications.
- Interview and select SEPG members.
- Define SEPG roles and responsibilities.
- Define relationship with MSG.
- Define relationships with TWGs and the rest of the organization, including reporting, tracking, and support requirements.
- Select SEPG leader (if not already assigned; likely to be SPI champion).
- Develop SEPG charter.
- Conduct team building for the SEPG (and between SEPG and other entities defined).

- Develop process to provide for succession and member replacement.
- Plan for succession and member replacement.

Exit Criteria

- SEPG members selected.
- SEPG charter developed and approved.
- SEPG leader appointed.

1.6.3 Maintain Visibility

Purpose

The purpose of maintaining visibility of a SPI program is to

- keep senior management attention focused on the long-term program
- provide information to the organization as a whole to see the effort and progress of the SPI program
- provide ongoing recognition of what is happening within the SPI program as it evolves

SPI programs are launched and sponsored by executive management, but they are often forgotten or become invisible after the initial fanfare is over. Having a regular time set aside at all levels of management for paying attention to the SPI program keeps the program in focus and maintains its visibility. This will enable management to respond to situations that arise at individual sites before these situations become crises. Successes can be shared, and a common vision and approach to the SPI program can be developed across the entire organization.

Maintaining visibility of the SPI program and its activities is crucial to the survival of the program. During the early part of the program, the SPI program does not provide highly visible results. There is a tendency to lose sight of the objectives and long-term nature of the SPI program, especially during periods of organizational upheaval and crisis. Quite often SPI programs die through neglect rather than deliberate termination, as individuals become more concerned and involved with day-to-day crises and lose focus on the long-term benefits.

The Maintain Visibility activity is initiated once the organization has decided to undertake a SPI program. This activity will remain active for the duration of the SPI program. In the early stages of the SPI program, this activity consists of building an awareness and generating support for the undertaking. While the improvement program is

underway this activity serves to continuously reinforce the benefits of the SPI program.

The organization can determine the effectiveness of the communications activity by surveying the members of the organization to see if the messages are being heard and are understood.

Objectives

- Keep all levels of management informed on the issues, progress, and results of the SPI program.
- Keep the entire organization informed on the progress and results of the SPI program.
- Publicly recognize efforts of individuals and teams in the SPI program.

Entry Criteria

SPI program approved and under way.

Tasks

- Conduct management and practitioner briefings and reviews.
- Establish organization-wide communication vehicles (such as newsletters, town-hall type meetings, brown bag seminars) to keep the entire organization informed on the progress and results of the SPI program.
- Establish a recognition program that publicly demonstrates rewards for SPI efforts and results.

Exit Criteria

- The program must maintain visibility of its efforts throughout its lifetime. There is no exit from communicating progress and results unless the entire program is terminated.
- Specific messages must be effectively communicated. The members of the organization should be periodically surveyed to ensure that the messages are being received.

1.6.4 Facilitate and Encourage Information Sharing

Purpose

The busier SPI programs get, the less time there is to share information between the SEPG and the rest of the organization, especially those not directly involved in a SPI program, and also between other SEPGs in the organization. Sometimes these organizations are solving some of the same or related problems, or breaking the same ground on how to become more effective in their SPI work. More formal and informal mechanisms to facilitate and encourage information sharing can help prevent reinventing the wheel.

The purpose of such mechanisms is simply to cause information to be shared in a regular, structured fashion so that such exchanges do not get lost in the day-to-day business of the SPI program.

There are two main dimensions to information sharing: local (site information sharing) and global (information sharing between organizations). Local information is shared through a variety of means such as monthly newsletters, brown bag lunches, attendance by the SEPG at various staff meetings, etc. Global information is shared by holding periodic meetings (at least quarterly) where the SEPGs from different organizations are brought together, preferably away from their work environments, with a structured agenda to share lessons learned, problems encountered, and successes. Where several SEPGs are close to each other geographically, local **software process improvement networks (SPINs)** may be a vehicle for information sharing. These usually meet monthly.

To validate the effectiveness of the information sharing activities, you can conduct surveys as to what information is being shared and the value of such sharing.

Objectives

- Establish periodic, planned SPI program meetings to share information locally about effective practices and learn from others' efforts.
- Establish periodic, planned cross-organizational meetings of SEPGs to share information globally about effective practices and progress, and to learn from other organizations.

Entry Criteria

- SPI program under way.
- For multi-organizational sharing, more than one organization must have a SPI program under way.

Tasks

- The local SEPG sets up periodic (perhaps quarterly) meetings that the key participants in the SPI program—MSG members, TWG leaders, process owners and architects, and **pilot** project leaders—attend.
- A corporate SEPG sets up periodic (perhaps annual) meetings to bring the various local SEPGs together.
- Incentives and recognition are provided for participating in local and global meetings.
- Track long-term usage of practices to see how widely they are adopted.

Exit Criteria

- As long as the SPI programs are running in organizations, information should be shared among the various participants.
- Meetings should occur at frequent enough intervals so that practices can be shared before they are reinvented.

1.6.5 Retain Lessons Learned and Improvements Developed

Purpose

While the information-sharing activities described previously facilitate sharing of lessons learned, successes, and typical problems and their resolution, they only do so for the immediate time frame. As SEPGs evolve and personnel rotate, these lessons become lost and forgotten, and the SEPGs find themselves "reinventing the wheel" when they run into the same or similar problem later.

Lessons learned should be formally documented and saved for future reference. Specific activities to gather lessons learned should be incorporated and planned into the SPI activities.

The SPI program must establish or integrate with an existing long-term memory capability to facilitate the organization's continued growth and maturity. To achieve this, creation of a repository or **process database** is vital. This is a mechanism where lessons learned, successes, and examples of the artifacts coming out of SPI programs are maintained and distributed. Information should be regularly captured on such things as

- the process for SPI
- processes and products produced
- examples of artifacts generated during a SPI program (for example, action plans)
- solutions developed and how they were applied

In addition to being used to collect information, the samples collected should be transformed into generic templates, and the lessons learned folded into a continuously updated approach that is disseminated to all SPI participants. This kind of activity can be done within the SEPG and TWGs on a local basis, or may require some focused corporate resources to be effective. For most effective corporate-wide learning, all sites should contribute to and draw

from the collective repository. In the absence of a corporate-wide effort, local SEPGs and TWGs could still perform this function for their organizations.

These lessons learned will be used during the Leveraging phase (page 127). They will be reviewed and analyzed when preparing for the next cycle through the IDEAL model.

Objectives

- Establish criteria and processes for information gathering and retention.
- Collect and disseminate lessons learned.
- Develop generic, reusable components of SPI program.

Entry Criteria

- SPI program under way.
- Local SEPG established.
- SPI program has information to share.

Tasks

- Establish criteria for information to retain.
- Establish processes for collecting, cataloging, and disseminating information.
- Create SPI repository.
- Collect and catalog process information and lessons learned.
- Periodically publish index of materials in repository.
- Derive generic components (templates, tools, methods, etc.) for reuse by other SPI programs.
- Disseminate lessons learned and generic components to all SPI participants.
- Publicize use of repository items by using success stories, recognition programs, etc.
- Track usage of components, requests for specific types of information, inflow and outflow of information, and other measures that indicate the effectiveness of the repository.

- Ultimately, assess whether the repository gets used, stays current, and becomes part of the standard operating environment of the organization.

Exit Criteria

The collection and dissemination of information about SPI must continue as long as the organization wants to continue to learn from and improve on its past efforts and not lose organizational memory.

1.6.6 Provide a Support Network

Purpose

For most organizations, SPI is a new activity; thus, new knowledge, skills, and behaviors must be learned and some old ways of doing things stopped. This requires personal as well as organizational change, and the people involved need support to keep making progress in learning new ways of doing things.

With an informal, peer-to-peer support network established, SEPGs and other SPI participants can go directly to their peers in other organizations or at other sites to get advice and support. They can find qualified, experienced people to help fill the gaps where they might not have sufficient resources to do something. They can call on their peers to get advice and try out their ideas.

To make this effective, they have to know their peers and trust them. They may start to build a “super” team consisting of SEPGs across all sites, establishing an informal network of SPI programs. This cannot be accomplished just through information-sharing mechanisms. Team building activities should be planned and coordinated. Some mechanisms that have been used effectively are

- common training
- collaboration on assessments
- joint process improvement projects across the organization

With a corporate SPI infrastructure, there are opportunities for economies of scale that are not available in a single-site activity. If a majority of the members of a single site SEPG leave for some reason, usually the new group must go outside for new training and orientation. The new group may even have to back up several steps and start again with all the facilitation and support provided at their start-up. This can become very expensive over a large number of

sites, especially in an environment in which people regularly rotate assignments, or in which staff downsizing is occurring. Furthermore, SEPG members at a single site have to translate all advice from their facilitators and teachers to their context and have to keep calling on that initial start-up support organization for assistance and advice.

Objectives

- Establish a broad, informal, company-wide network of SEPGs.
- Establish programs and mechanisms for SEPGs to work together.

Entry Criteria

- SPI program underway.
- Local SEPG established.

Tasks

- Provide common training for all SEPGs.
- Plan supporting activities between SEPGs (such as collaboration on assessments and joint, cross-organizational improvement projects).
- Create a directory of SEPG members across the company and their specific areas of expertise.
- SEPG members spend some amount of time outside their home organizations helping other SEPGs.

Exit Criteria

This activity must continue as long as the various SEPG members across the company need support, which is likely to be as long as their own program is running.

1.7 Assess the Climate for SPI

Purpose

The purpose of assessing the climate for SPI is to identify barriers and leverage points across the organization that will have an impact on the SPI program, and to develop effective plans to ensure that the improvements made during the SPI program last.

A substantial portion of this task is based on concepts of managing technological change.

Objectives

- Identify key organizational barriers to a SPI program.
- Define strategies to reduce those barriers.
- Define strategies to interact with other related programs and initiatives.
- Develop a strategy for enhancing and maintaining sponsorship of the SPI program.
- Update the organization's SPI communications plan.
- Develop a program to enhance change agent abilities.

Entry Criteria

- MSG and SEPG members have taken a course in managing technological change.
- The infrastructure has been defined in terms of specific people, organizational entities, roles and responsibilities, and interfaces.
- The infrastructure is in place and operating.

Exit Criteria

- Organizational diagnostics are complete.
- Sponsorship strategies and organization communication plan have been completed.
- Interfaces and interactions with other programs and initiatives have been defined.
- Change management strategy developed.

- Updated organization SPI communication plan and sponsorship enhancement and maintenance strategies.

Tasks

- Using organizational diagnostics, assess the history of barriers to implementing similar change programs.
- Assess the organization's culture and identify related barriers and leverage points.
- Assess sponsorship for SPI and determine what is needed to improve it.
- Assess current resistance to a new SPI program and identify related barriers and leverage points.
- Identify what other improvement activities and major developments are already occurring and determine how to interface and interact with them.
- Develop change management strategies to reduce or remove barriers, capitalize on leverage points, cascade sponsorship for SPI, manage target resistance to changes, and generally increase the organization's capacity for change.
- Update the organization communication plan including messages, audiences, media, sequencing, and monitoring to implement the change management strategies.

1.8 Define General SPI Goals

Purpose

Software process improvement is a long-term investment. Clearly defined, measurable goals are necessary to provide guidance and to assist in developing tactics for improvement. They also allow objective measurement of the improvement results.

Good goals are few in number, critical to the organization, highly visible, and built with consensus—both horizontally and vertically. To build good goals will require a substantial amount of bi-directional communication between different management groups and between management and practitioners.

Both long-term and short-term goals are necessary to focus the effort. The goals produced at this point tend to be general in nature until sufficient information is collected to quantify them. The quantification step is described in Step 3.11 on page 88.

Objectives

- Define long-term and short-term goals.
- Determine what measurements are needed to objectively determine goal satisfaction.

Entry Criteria

- SPI strategy can be clearly linked to the vision.
- SPI strategy can be clearly linked to the business plan.
- The key business drivers have been clearly defined.
- Barriers and leverage points from past efforts are identified and strategies for reducing the barriers defined.
- Understanding of the priorities and key near- and long-term business issues.

Exit Criteria

General SPI goals defined.

Tasks

- Gather information and data on what achievements "best of class" organizations are accomplishing.
- Define high level goals from vision, business plan, key business issues, and past history of improvement efforts.

1.9 Define the Guiding Principles of the SPI Program

Purpose

The SPI program can be used as a model and a mechanism for experimenting with different processes and behaviors that are desired. A typical guiding principle is to use the SPI program to experiment with revised management processes, such as new forms of planning, tracking, etc. New methods can "fail" on a SPI task with much less dramatic effect on the organization's customers. Failure in this sense means that the new process does not work as well or efficiently as initially expected—a common flaw of first-time pilots of a new or revised process.

Any such guiding principles should be documented for people to use as guidance in the SPI **strategic action plan**.

Objectives

Define guiding principles for SPI program.

Entry Criteria

Lessons learned from past efforts are identified.

Exit Criteria

Guiding principles defined and documented in the "Guiding Principles" section of the SPI strategic action plan.

Tasks

- Review other organizations' guiding principles for SPI.
- Select and define guiding principles for the SPI program.
- Document guiding principles in "Guiding Principles" section of the SPI strategic action plan.

1.10 Launch the Program

Purpose

The purpose of this activity is to move into the main part of the SPI program and start the continuous cycle of the process improvement program.

Usually this begins with an "SEPG kickoff" workshop that refreshes the memory of the MSG and SEPG members about what the process improvement activity is and what kinds of things the SEPG and MSG will have to do in subsequent steps.

Objectives

Transition from initial activities to ongoing activities.

Entry Criteria

- SPI proposal approved.
- Sponsorship and organization communication strategy and plans completed.
- Interfaces and interactions with other programs and initiatives defined.
- Infrastructure established in terms of specific people, organizational entities, roles, responsibilities, and interfaces.

Exit Criteria

- Program and infrastructure in place and operating.
- Agreement and approval to move to next the step.

Tasks

- Learn about the SPI techniques and the SPI process selected. (Conduct an "SEPG kickoff" workshop.)
- Review the SPI proposal.
- Review organizational assessment results (from Step 1.7 on page 47).
- Review interaction plans for other programs and initiatives.
- Obtain senior management approval to move to the next phase, the Diagnosing phase (page 53).

2.0 The Diagnosing Phase

Overview

The management steering group (MSG) must understand the organization's current software process baseline so that it can develop a plan that will achieve the business changes specified in the organization's software process improvement (SPI) goals. The baselining activities performed in the Diagnosing phase will provide this information into the SPI planning and prioritization process.

The SPI strategic action plan, which will be developed after the baselining activities are complete, is critical: it is needed to provide clear guidance for the various process improvement actions that will be taken over the next few years. It should provide clear business reasons for conducting the SPI program and should be clearly and measurably linked to the organization's business plan and vision.

The baselines will provide information on how and how well the organization currently performs its software activities. The knowledge of the strengths and opportunities for improvement is an essential prerequisite for identifying and prioritizing an effective and efficient SPI program.

The primary output of this phase is the Final Findings and Recommendations Report, which is produced as a result of the baselining activities. Secondary outputs may be revisions to the organization's vision and business plan,

A recommended minimum set of baselines includes

- organization process maturity baseline (See Appendix C.0 on page 203).
- process description baseline (initial software process map)
- metrics baseline (initial level of business and process metrics to measure progress against)

For each baseline, many effective methods of gathering information are available. For the process maturity baseline, an authorized lead appraiser can conduct a **Capability Maturity Model (CMM)** -based appraisal for internal process improvement (CBA IPI), or the organization's own personnel can be trained to appraise their process maturity. Appraisals that are based on the CMM use a set of common requirements that are described in the *CMM Appraisal Framework, Version 1.0*.[1]

The MSG must choose the number and type of baselines that best achieve the objectives it has set so that a findings and recommendations report can be obtained from each.

Information about the current state of the organization flows to the MSG by means of the **Baseline Findings and Recommendations Reports**. Because the baseline reports will not necessarily coincide in time, information will flow irregularly. As information is available, the MSG incorporates it into the improvement plans. Baselines do not determine the strategy, however. The strategy for improvement must be based on business goals and needs. The baselines can help determine the current state of the organization with respect to achieving those goals or being capable of achieving them.

Information on the current state will also be used by the technical working groups (TWGs) during the Acting phase (page 93) to develop process improvement solutions. Keeping the momentum of process improvement between baselining and deployment is very important.

Baselines are intended to be iterative; the major baselines conducted at this point provide a snapshot of the organization's various capabilities, processes, and measures at a certain point in time. Subsequent cycles through the IDEAL model will require repeated baselining to show what progress or changes have taken hold in the organization. Software maturity baselines should be repeated every eigh-

1. Masters, Steve; & Bothwell, Carol. *CMM Appraisal Framework, Version 1.0* (CMU/SEI-95-TR-001). Pittsburgh, Pa.: Software Engineering Institute, Carnegie Mellon University, 1995.

teen months to three years. Metrics baselines should probably be taken more often, depending on the business cycle of the organization (if the organization goes through a full cycle only every two years, more frequent metrics baselines would probably not be useful. On the other hand, if the organization goes through a product cycle every three months, metrics baselines could be taken annually.)

Purpose

- Determine what baselines are required
- Perform baselining activities
- Produce Findings and Recommendations report

The purpose of this phase is to perform the baselining activity to get a picture of the organizations current strengths and weaknesses. This information gathered from the baselines will then be used to initiate development of the SPI strategic action plan that will provide guidance and direction to the SPI program in the years to come.

The baselining activities must be self-verifying. The credibility of the baselines depends on their perceived ability to extract real, meaningful information from the organization and present it back to the organization in a coherent, actionable form.

Objectives

- Understand the working of the current processes and the organizational interactions and how they contribute to the organization's business.
- Gather information on the current strengths and opportunities for improvement in the organization for input to the SPI strategic action planning process.
- Build involvement, from the senior management team down to the practitioners, for process improvement tasks that will make the work of the organization more effective.
- Detail the starting point for measuring improvement

Education/Skills

Training and skill development for the Diagnosing phase is shown in the following table.

Education/Skills	MSG	SEPG	TWG	Appraisal Team	Practitioners
Interviewing skills		X	X	X	
Data reduction skills		X		X	
Business knowledge	X	X		X	
Baselining method		X		X	
Team skills		X	X	X	
Change management	X	X		X	

Commitment

The commitment that senior management makes for the Diagnosing phase is the time, resources and training required to complete the phase.

All members of the organization are also making a commitment that the baselines will be conducted under an agreement of confidentiality and that no attempt to find out the source of any piece of information will be tolerated.

Communication

Each of the baselining activities will have specific communication needs. In addition, getting the organization ready for baselining will require considerable communication, establishing dialogue between various levels and areas in the organization to maximize the effectiveness of the baselining teams.

Communicating the results of the baselining activities will have several positive effects on the SPI program. It will demonstrate that there are no secrets regarding the SPI program; and it will give everybody a clear understanding of the strengths and opportunities for improvement that the organization faces.

Entry Criteria

- SPI infrastructure, particularly MSG and software engineering process group (SEPG), is in place and operating.
- Resources are available to perform the baselines
- The MSG has decided that the SPI strategic action plan needs to be updated.

- The organization's vision, business plan, and SPI goals are synergistic.

Exit Criteria

- Baseline Findings and Recommendation Report delivered to the MSG and accepted.
- The draft of the SPI strategic action plan is initiated.

See Figure 2-1 on page 58 for a pictorial representation of the tasks associated with the Diagnosing phase of the IDEAL model.

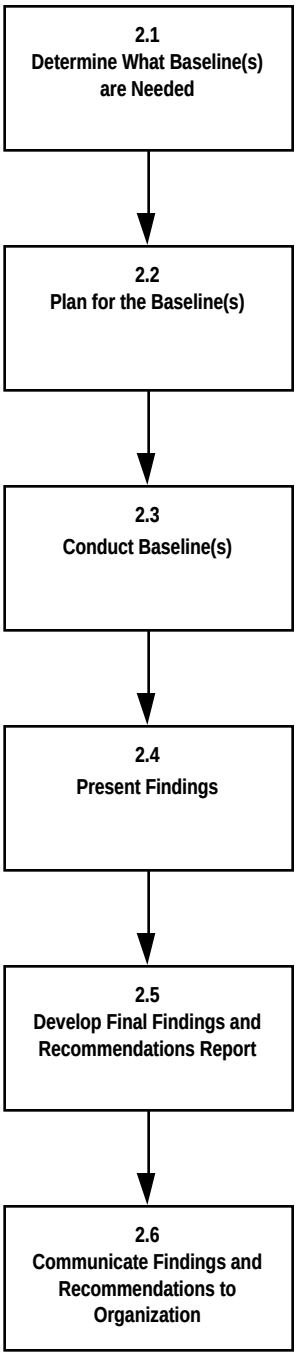

Figure 2-1: Process Flow for Diagnosing Phase

Tasks

The tasks for the Diagnosing phase are shown in the table below.

2.1 Determine What Baseline(s) Are Needed

Purpose

The organization has compelling reasons for undertaking a SPI program. The purpose of deciding how many and what type of baselines are to insure that the focus of the SPI program is linked to the business needs of the organization.

Determining what to baseline and how to baseline is a decision that very much depends on the organization. Many software organizations will have certain types of baselines determined for them, such as Software Engineering Institute (SEI) software capability evaluations (SCEs) for government contracts, ISO 9000 certifications, Malcolm Baldridge evaluations, or internal company audits. Even in the face of "external" baselines, an organization should create its own baseline activities that can be properly tuned to meet the business and information goals of the organization.

Objectives

- Determine how many baselines to perform.
- Determine what type of baselines to perform.

Entry Criteria

- Understanding of the impetus for SPI.
- Understanding of the purpose of the different baseline types.
- Infrastructure established and operating (MSG and SEPG).
- Understanding of the structure and function of the organizational components.

Exit Criteria

- Agreement on types of baselines to perform.
- Agreement on number of baselines to perform.

Tasks

- Review organization structure and responsibilities of organization components.
- Evaluate baseline information needed against organization structure and business drivers for SPI.

2.2 Plan for the Baseline(s)

Purpose

To accomplish the baselining activities requires a significant amount of coordination of people, data, facilities, training activities and support services.

This activity may repeat some of the work done in the Initiating phase (page 11). Sometimes this repetition is not needed, but often, the MSG has different members than those who set up the SPI program, and they will need to cover some of the same topics to develop their own understanding and strategy. When this step is entered as a result of a subsequent cycle through the IDEAL model, these topics should be reviewed at a minimum.

Objectives

- Insure that all aspects of the baselining activities are taken into account and have been planned for.
- Document the activities needed to accomplish the baselines.

Entry Criteria

- Infrastructure is in place and operating (MSG and SEPG).
- Baselining team selected.
- Types of baselines to perform are identified.

Exit Criteria

Plan for conducting the baselines has been created and approved. Roles and responsibilities defined and documented in the “Organization” section of the SPI strategic action plan.

Tasks

- Review activities for baselining efforts.
- Review resources required for baselining efforts.
- Recruit baselining team.
- Train baselining team in appraisal method(s).

2.3 Conduct Baseline(s)

Purpose

The purpose of conducting the baselines is to gather the factual information required to support the SPI effort. The information gathered will present a snapshot of the organizations strengths and weaknesses relative to its software development and software development management practices.

Objectives

Gather actual information regarding the strengths and weaknesses of the organization processes used in software development activities.

Entry Criteria

- Consensus and agreement on the baseline activities schedule.
- Baselining team selected and trained.
- Agreement/understanding regarding confidentiality of the findings data.
- Policies, procedures and guidelines that the organization has established for use in its software development activities are readily available.

Exit Criteria

- Baselining team has information to create a findings and recommendations report.
- Outbriefing for the baseline participants has been prepared.

Tasks

- Interview members of the software development staff.
- Interview members of the software development management staff.
- Review and analyze policy, procedures, and guidelines for software development activities.
- Validation of findings by review with participants.

2.4 Present Findings

Purpose

The baselining team, at the end of its baselining data collection activities, presents to the participants what it has found. This is in the form of a briefing that describes the method used, the participants, areas of investigation, and strengths and weaknesses that have been found.

Objectives

- Provide initial feedback to the participants on the results of the baselining activities.
- Build support and consensus regarding the validity of the findings.

Entry Criteria

- Baselining data collection activities completed.
- Baselining team has reached consensus on the strengths and weaknesses discovered.

Exit Criteria

Briefing of the findings to all participants has been conducted.

Tasks

Prepare briefing for participants that includes

- method used
- data sources
- strengths
- weaknesses
- next steps

2.5 Develop Final Findings and Recommendations Report

Purpose

The Final Findings and Recommendations Report documents the baselining effort and provides a lasting representation of the organizations current state. The baselining team will develop a set of recommendations to go along with the findings that were discovered during the baselining activity.

The baselines, particularly the process maturity baseline, typically identify issues and provide recommendations based on a much broader consensus than may have been available before. These issues and recommendations serve to provide some guidance and often, a prioritization of actions.

The results of the baselines will be incorporated into the SPI strategic action plan and reconciled with other existing and/or planned improvement efforts. This will result in a single strategy dealing with all software process improvement actions and all related improvement efforts affecting the same groups of people.

Objectives

Create a set of recommendations that address each of the findings from the baselining effort.

Entry Criteria

- Findings briefing from end of baselining activity available.
- Artifacts that were produced or reviewed during the baselining activity are available.

Exit Criteria

A Final Findings and Recommendations Report has been agreed upon and created.

Tasks

- Review data collected during baselining activities to develop recommendations regarding potential solutions.
- Write Final Findings and Recommendations Report.

2.6 Communicate Findings and Recommendations to Organization

Purpose

People will be wondering about all the activity that was occurring during the baselining. To alleviate any fears that may have developed, or that could develop, it is recommended that the results of the baselining activities be communicated to the entire organization.

The organization can accomplish this by holding a series of briefings such that all members of the organization hear the same message. This will contribute to building sponsorship and support for the SPI program.

Objectives

- Gain support and sponsorship for SPI.
- Gain consensus on areas that SPI will be addressing.
- Gain additional input regarding potential solutions.
- Tell organization what the next steps are.

Entry Criteria

- Final Findings and Recommendations completed.
- Outbriefing from baselining activities is available.

Exit Criteria

- All members of the organization have heard the same message and understand what the next steps are.
- Documented findings and recommendations distributed to employees.

Tasks

Prepare a briefing for all employees of the organization on results of baselining activities and next steps.

3.0 The Establishing Phase

Overview

Creating the strategic action plan for software process improvement (SPI) is one of the most critical in the SPI initiative—and most often neglected. This is where the management team develops or updates a SPI strategic action plan, based on the organization's vision, business plan, and past improvement efforts, along with the findings from the baselining efforts.

This is a step that is repeated as needed. Usually it is triggered by a lack of an action plan for an organization on its first cycle through the IDEAL model. For those organizations on a subsequent cycle, this step can be triggered by a need to update the previous plan, goals, or directions.

The management steering group (MSG) has the responsibility for creation of the SPI strategic action plan. In a sense, this is the creation of a "management" baseline, similar to the more process-oriented or technical baselines developed in the Diagnosing phase (page 53).

There is a strong tendency to delegate this step to the software engineering process group (SEPG). Experience has shown, however, that this usually is not the best approach. Line managers must demonstrate their active sponsorship by taking the time to be actively involved in developing this plan, owning it, and committing to it. Just as the practitioners and **middle management** develop ownership of the technical baselines and issues identified through their involvement, so must the senior management develop ownership and consensus on the directions to be taken and how to get there.

Without a solid strategy to guide the SPI program, it will have a tendency to "drift" with the problems and priorities of the month (or day in some cases), causing the initiative

to degenerate into not much more than another fire-fighting activity.

The MSG begins by determining what kind of strategic planning process it will follow. Most organizations have their favorite approach to strategic planning. Regardless of the specific method used, the important thing is to develop a solid plan.

The MSG then reviews the organization's vision, business plan, past improvement performance, and current key business issues in order to determine how the SPI program fits. It then considers the results of baselining activities and incorporates these results into the SPI strategic action plan. The MSG also integrates the SPI strategic action plan with the organization's vision and business plan, making modifications and revisions as necessary.

The SPI strategic action plan will be based on the results of the baselining efforts performed in the Diagnosing phase of IDEAL, the organization improvement goals, and the resources available. It should provide guidance for the overall SPI program, define the long range goals and address how those goals will be reached. It is important that the process improvements are driven by business needs, as opposed to process improvement for its own sake.

There is a strong temptation at this point to immediately begin making changes. Experience shows that without careful planning, the efforts will eventually falter, get sidetracked, or will not meet the unwritten expectations of senior management. The reason for the plans is not just to identify the improvement, but to meet the organization's critical business needs by installing those improvements across the organization. Identification of the improvements is often the easiest part. Getting everyone throughout the

organization to change the way they do things is always the most difficult part of any improvement effort.

Purpose

The purpose of this step is to develop or refine a SPI strategic action plan that will provide guidance and direction to the SPI program in the years to come. The SPI strategic action plan is critical in that it is needed to provide clear guidance to the various process improvement actions that will be taken over the next few years. It should provide clear business reasons for conducting the SPI program and should be clearly and measurably linked to the organization's vision and business plan.

The primary output of this step is the SPI strategic action plan. Secondary outputs may be revisions to the organization's vision and business plan.

Objectives

- Develop/update a long-term (three- to five-year) SPI strategic action plan that encompasses the entire organization's software process improvement activities and integrates them with any other total quality management (TQM) initiatives already planned or in process.
- Develop/update long range (three- to five-year) and short term (one-year) measurable goals for the organizations SPI program.
- Integrate the baseline findings and recommendations into the SPI strategic action plan.
- Integrate the SPI strategic action plan with the organization's business plan, mission, and vision.

Education/Skills

Training and skill development for the Establishing phase is shown in the following table

Training	MSG	SEPG	TWG	Line Managers	Practitioners
Strategic planning	X	X			
Team skills	X	X	X		
Vision development	X	X			
Sponsorship	X	X		X	

Training	MSG	SEPG	TWG	Line Managers	Practitioners
Facilitation	X	X	X		
Business planning	X	X		X	

Commitment

This step requires a substantial commitment from senior management, primarily of their own time, to work on developing the SPI strategic action plan. Senior managers must commit to leading the SPI program by demonstrating to everyone that even they are willing to take the time to develop a good plan for their team's activities and then to follow it. In the process, senior management should learn and use the same methods and techniques that the technical working groups (TWGs) will have to learn. Demonstrating visible sponsorship in this way can go a long way toward convincing people that management is serious about software process improvement.

Communication

The MSG will be communicating with other (non-software) senior management in developing objectives and goals. The baseline teams have reported issues, results, and recommendations, which will support and be incorporated into the SPI strategic action plan.

Entry Criteria

- The SPI infrastructure is in place and operating.
- The MSG has decided that the SPI strategic action plan needs to be updated.
- Baselining activities have been completed.

Exit Criteria

- The SPI strategic action plan is complete and approved.
- The organizations vision, business plan, and SPI strategic action plan are synergistic.

See Figure 3-1 on page 71 for a pictorial representation of the tasks for the Establishing phase.

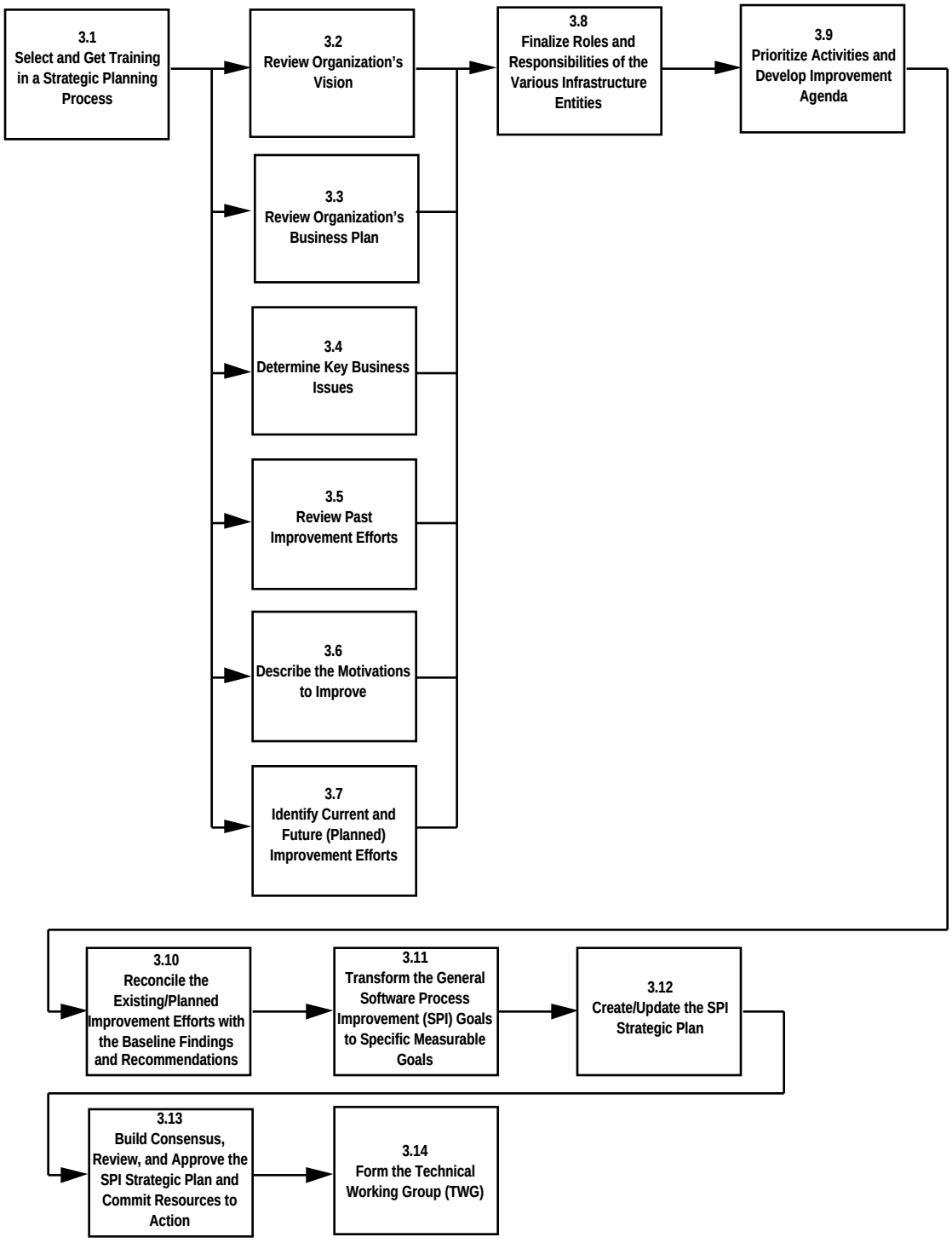

Figure 3-1: Process Flow for Establishing Phase

Tasks

The tasks for the Establishing phase are shown in the table below.

3.1 Select and Get Training in a Strategic Planning Process

Purpose

The purpose of this activity is to choose a consistent approach to planning for the SPI program and to develop skills in building a solid planning foundation upon which to sustain the SPI program.

Objectives

- Select a planning process.
- Train the MSG and SEPG in the process and methods.

Entry Criteria

The SPI infrastructure, particularly the MSG and SEPG, is in place and operating and has started a strategic planning effort.

Exit Criteria

The MSG and SEPG have completed training in the process.

Tasks

- Review strategic planning methods already in use.
- Review planning needs for the SPI program.
- Select a planning process and approach.
- Contract for, schedule, and hold planning training.

3.2 Review Organization's Vision

Purpose

The purpose of this activity is to clearly link the SPI strategy to the organization's vision and direction so that guidance to the SPI program can be consistent with guidance to other activities within the organization.

This activity may repeat some of the work done in the Initiating phase (page 11). Sometimes this repetition is not needed, but often, the MSG has different members than those who initiated the SPI program, and they will need to cover some of the same topics to develop their own understanding and strategy. When this step is entered as a result of a subsequent cycle through the IDEAL model, these topics should be reviewed at a minimum.

Objectives

- Review and possibly modify current vision.
- Generate new vision if one does not exist or if the existing one is not adequate.
- Identify goals and motivations for the SPI program.

Entry Criteria

The MSG and the SEPG have completed training in the strategic planning process.

Exit Criteria

- The SPI goals that are driven by the vision are identified.
- The motivations for the SPI program that derive from the vision are identified.
- The vision and SPI strategy are synergistic.

Tasks

- Review existing vision for adequate linkage to SPI program.
- Modify or generate new vision if current one is inadequate.
- Identify goals for the SPI program, based on the vision.
- Identify motivations for the SPI program based on the vision.

3.3 Review Organization's Business Plan

Purpose

The purpose of this activity is to clearly link the SPI strategy to the organization's business plan so that guidance to the SPI program can be consistent with guidance to other activities within the organization. While not all process improvement activities can easily be linked to a business plan or goals, that does not mean that they are not needed. Some things must be done because they make the business run better, but they do not directly contribute to the bottom line.

This activity may repeat some of the work done in the Initiating phase (page 11). Sometimes this repetition is not needed, but often, the MSG has different members than those who set up the SPI program, and they will need to cover some of the same topics to develop their own understanding and strategy. When this step is entered as a result of a subsequent cycle through the IDEAL model, these topics should be reviewed at a minimum.

Objectives

- Review and possibly modify current business plan.
- Generate new business plan if one does not exist or if the existing plan is not adequate.
- Identify goals and other (possibly competing) initiatives.

Entry Criteria

- The MSG and SEPG have completed training in the strategic planning process.
- Organizations vision is defined and communicated.

Exit Criteria

- The SPI goals that are driven by the business plan are identified.
- Other improvement efforts that complement or compete with the SPI program are identified.
- The business plan and SPI strategic plan are synergistic.

Tasks

- Review existing business plan for adequate linkage to SPI program.
- Modify or generate new business plan if current one is inadequate.
- Identify goals for the SPI program driven by the business plan.
- Identify other initiatives that may support or compete with the SPI program and the degree of impact.

3.4 Determine Key Business Issues

Purpose

Unless the SPI program is driven by the current business needs and understood and agreed to by management, it will likely be difficult to sustain the program over the long haul. This is because it will be difficult to clearly demonstrate to senior management that the initiative is achieving real value for the organization in business terms.

The key business needs have to be clearly defined, measurable, and understood to provide a common view to the SPI teams. Improvements should be selected based in part on their ability to satisfy these business needs. As described previously, not all process improvement activities can easily be linked to current business issues; however, the business issues identified should be used to prioritize SPI projects.

This activity may repeat some of the work done in the Initiating phase (page 11). Sometimes this repetition is not needed, but often, the MSG has different members than those who set up the SPI program, and they will need to cover some of the same topics to develop their own understanding and strategy. When this step is entered as a result of a subsequent cycle through the IDEAL model, these topics should be reviewed at a minimum.

Objectives

Determine the key business issues driving the need for software process improvement.

Entry Criteria

- The MSG and SEPG have completed training in a planning process.
- Organizations vision is documented.
- Organization's business plan is up to date.

Exit Criteria

- The key business drivers have been clearly defined.
- Criteria for prioritizing SPI projects have been developed.

Tasks

- Review the current short-term and long-term business issues as they affect SPI.
- Develop prioritization criteria for selecting and launching SPI projects, based in part on the identified business issues.

3.5 Review Past Improvement Efforts

Purpose

People typically repeat past behaviors, including those that lead to success and those that do not. The organization must ensure that mistakes are not repeated that may have caused similar initiatives to fail in the past.

The information collected in Step 1.7 on page 47 is reviewed and analyzed, identifying past change or improvement projects and assessing how successful or unsuccessful they were and why.

Objectives

Review past change and/or improvement efforts and identify successful practices to leverage and unsuccessful practices to avoid.

Entry Criteria

- The MSG and SEPG have completed training in a planning process.
- Assessment data from Step 1.7 is available.

Exit Criteria

Barriers and leverage points from past efforts are identified and strategies for reducing the barriers defined for this initiative.

Tasks

- Identify successful and unsuccessful change or improvement projects and determine what made them so.
- Complete necessary assessments from the Managing Technological Change course (if not already done in Step 1.7).
- Define strategies to deal with trends and barriers identified by organizational diagnostics.

3.6 Describe the Motivations to Improve

Purpose

People must understand why the organization is spending so much time and effort on a SPI program. As their understanding grows so will their support. They must be motivated to join in the effort and assist it.

The motivation should address the following points:

- Why change?
- What's wrong with the status quo?
- Why should I care?
- When will I be affected (immediately or sometime in the future)?

Typically, successful motivations sell the pain of the status quo, as opposed to selling the promise of the desired state. These motivations should be documented in the SPI strategic action plan. Also, the communication plan should be updated to insure that communications of the motivations to improve is given to the entire organization.

Objectives

Define motivations for SPI program.

Entry Criteria

Motivations identified from the vision or similar sources.

Exit Criteria

Defined motivations are documented in SPI strategic action plan ("Motivations" section).

Tasks

- Build list of motivations from the goals and problems identified in previous steps.
- Frame motivations in terms of the difference between the current state and the desired state.
- Document motivations in "Motivations" section of the SPI strategic plan.

3.7 Identify Current and Future (Planned) Improvement Efforts

Purpose

Identify other initiatives the organization may have under way. This is done during a review of the organizations vision, business plan, and past improvement efforts.

Typically, most organizations have many different improvement efforts under way. Often these initiatives are un-coordinated and compete with each other for scarce resources. If an organization is to maximize the effectiveness of its investment in software process improvement, it must evaluate all of the initiatives under way and determine how much it is investing in each one and in total.

Resistance to change is also directly correlated to the total amount of change required of individuals. For an organization to get the best results, the cumulative impact of all improvement efforts should not be overwhelming to anyone. The results from the baselining activities will be prioritized against and reconciled with the existing and currently planned initiatives.

Objectives

Identify all existing and/or anticipated improvement efforts in this organization, either internally or externally driven (such as corporate initiatives).

Entry Criteria

Initiatives identified from a business plan or similar sources.

Exit Criteria

Other initiatives identified, prioritized, and preferably reconciled, with the results documented in the SPI strategic plan.

Tasks

- Identify all existing and/or anticipated improvement efforts in this organization, either internally or externally driven (such as corporate initiatives).
- Estimate resource investments in each and resources required to complete, including deploying the resulting improvements throughout the organization.
- Estimate the total amount of resources that the organization is able and willing to commit to these initiatives.
- Prioritize the unique initiatives based on resource limitations and determine what areas the organization is willing to apply resources to and how many resources it is willing to apply.
- Document the results in related initiatives identified in "Improvement Agenda" section of the SPI strategic plan (see Appendix B.0 on page 185).

3.8 Finalize Roles and Responsibilities of the Various Infrastructure Entities

Purpose

Initial charters, along with a definition of the roles and responsibilities of the infrastructure, may now be outdated. For those going through the IDEAL cycle for the first time, you should now have a lot more knowledge about what SPI is and what is needed to make it successful. It would be beneficial to review the roles and responsibilities that you initially defined for your infrastructure and make any necessary adjustments. For those who are reentering the Establishing phase from a previous cycle through the IDEAL model, you should have lessons learned that you may want to apply to the roles and responsibilities defined for the infrastructure.

This activity may repeat some of the work done in the Initiating phase (page 11). Sometimes this repetition is not needed, but often, the MSG has different members than those who set up the SPI program, and they will need to cover some of the same topics to develop their own understanding and strategy. When this step is entered as a result of a subsequent cycle through the IDEAL model, these topics should be reviewed at a minimum.

Objectives

- Finalize roles and responsibilities for the SEPG, MSG, and any other SPI management and coordination groups.
- Define typical roles and responsibilities for TWGs in terms of their responsibilities, authority, reporting requirements, etc.

Entry Criteria

- Infrastructures charters available.
- Action planning activity launched.

Exit Criteria

Roles and responsibilities defined and documented in the "Organization" section of the SPI strategic plan.

Tasks

- Define roles and responsibilities for the MSG, SEPG, TWGs, etc. (or extract from their charter).
- Document roles and responsibilities in the “Organization” section of the SPI strategic plan.

3.9 Prioritize Activities and Develop Improvement Agenda

Purpose

The baselines, particularly the maturity baseline, typically identify issues and provide recommendations based on a much broader consensus than may have been available before. These issues and recommendations serve to provide some guidance, and often, a prioritization of actions.

Publicly document an objective approach to deciding which of the many competing SPI recommendations and actions will be launched and funded. This approach will be dependent on the business needs of the organization. This procedure will be used whenever new ideas are added to the list of actions awaiting resources.

Objectives

Define criteria for selection of SPI projects.

Entry Criteria

Prioritization criteria developed from key business issues has been defined.

Exit Criteria

Criteria for selection of SPI projects defined and documented in the SPI "Improvement Agenda" section of the SPI strategic plan.

Tasks

- Define criteria to be used to select improvement action items from a list and launch them.
- Define a process to apply those criteria.
- Define a process to add new improvement actions and to remove outdated improvement actions from the pending list.
- Document the criteria in the "Improvement Agenda" section of the SPI strategic plan.

3.10 Reconcile the Existing/Planned Improvement Efforts with the Baseline Findings and Recommendations

Purpose

The results of the baselines should be incorporated into the SPI strategic action plan and reconciled with all other existing and / or planned improvement efforts. This will result in one single strategy dealing with all software process improvement actions and all related improvement efforts affecting the same groups of people.

Objectives

- Incorporate baseline results into the SPI strategic plan.
- Reconcile baseline results with all other existing and/or planned software improvement activities.

Entry Criteria

- Baselining activities completed and findings and recommendations report available.
- Other existing or planned improvement efforts identified.
- SPI strategic action plan draft.

Exit Criteria

- A single coherent strategy, incorporating baseline results and other improvement efforts.
- Matrix relating baseline recommendations and issues to other existing/planned activities.
- Reconciled plan.

Tasks

- Review the results of the baseline efforts.
- Build a matrix relating recommendations from the baselines to existing and planned activities.
- Document motivations to improve.
- Review/revise goals as appropriate.

3.11 Transform the General Software Process Improvement (SPI) Goals to Specific Measurable Goals

Purpose

Now that the results of the baseline activities have been reconciled, sufficient data should be available to take the general long-term and short-term goals developed in Step 1.8 on page 49 and make them specific. This is done by incorporating the measurement of the current state of those goals and defining an aggressive but achievable improvement in those measures.

For example, one general goal could have been to make software projects more predictable in terms of cost and schedule. The measurement baseline established that 80 percent of current projects exceed their original cost and schedule estimates by more than 25 percent. The transformed goal could be to improve that measure such that 80 percent of all projects complete within 10 percent of their original estimates, (adjusted for changes of scope along the way) within 2 years.

The above is an example of how to transform a general business goal into a specific measurable process improvement goal.

Objectives

Transform all general goals into specific, measurable goals.

Entry Criteria

- Measurement baseline complete.
- High level goals defined during the Initiating phase available.

Exit Criteria

Measurable goals finalized in SPI strategic plan.

Tasks

Transform the goals into measurable specific improvement goals.

3.12 Create/Update the SPI Strategic Plan

Purpose

Now that all sections of the SPI strategic action plan are ready, the plan has been reconciled with the baseline results, and the goals transformed, the plan has to be put together, edited, and finalized.

Objectives

Finalize the SPI strategic plan.

Entry Criteria

- All sections of the strategic action plan completed or inputs finalized.

Exit Criteria

Complete SPI strategic plan written.

Tasks

- Merge the various sections developed during previous steps in this process.
- Edit, resolving inconsistencies, etc.
- Prepare final draft for review.

3.13 Build Consensus, Review, and Approve the SPI Strategic Plan and Commit Resources to Action

Purpose

The action plan will be no good if it is built in a vacuum and only a small group believes in it. To be useful, it has to be "sold," and consensus has to be developed.

The action plan that is developed needs to be communicated to the organization. You are expecting the components and personnel within the organization to make this plan work; it is only proper that you communicate what is in it and expected of them.

Objectives

- Approve SPI strategic action plan.
- Build consensus and commitment to the plan.

Entry Criteria

Completed draft plan ready.

Exit Criteria

SPI action plan finalized and approved.

Tasks

- Present/review the plan at all levels of the organization.
- Collect comments and suggestions and resolve conflicting ideas.
- Incorporate all changes and have all senior line managers as well as the organization's senior manager sign the plan.
- Publicize the plan (send a copy to everyone in the organization).

3.14 Form the Technical Working Group (TWG)

Purpose

For improvements that take more than a couple of days of one person's time and affect several people, a team approach usually works best. The team should be composed of volunteers from the target audience (those who will ultimately adopt the process improvement) who are enthusiastic about working on the improvement. This group of people can be identified during the baselining portion of the activity. In the recommendation-generating step of the maturity baseline, people can be asked to rank the alternatives by their own enthusiasm. When a particular solution area is decided upon, these people can be contacted to commit to the project "for real."

Objectives

Build a team from people with diverse backgrounds who all have a stake in the area of improvement.

Entry Criteria

- **TWG charter** and draft **tactical action plan** from MSG/-SEPG.
- High-level process descriptions from process baselining step.
- Process maturity issues from maturity baselining step.
- Related recommendations and "low-hanging fruit" from maturity baselining step.
- Key process metrics from metrics baselining step.

Exit Criteria

TWG established.

Tasks

- Assign MSG sponsorship responsibility for the TWG to one MSG member. The TWG needs one person on the MSG to act as primary sponsor and advocate. This person is usually the process owner of the particular area the TWG is going to be improving. The MSG sponsor will have the responsibility to communicate issues about the TWG activities to other MSG members and to give feedback to the TWG from the MSG.

- Assign SEPG liaison responsibility for the TWG to one SEPG member. The SEPG liaison
  - acts as facilitator or "quality advisor" (see Scholtes, Peter R., *The TEAM Handbook: How to Use Teams to Improve Quality*) to the TWG
  - brings the data from the baselining steps to the other TWG members
  - facilitates the flow of information between the various people and groups involved in process improvement, such as between the TWG and the MSG and other organizations, and among the team members themselves.
  - acts as the surrogate leader, when the TWG is beginning its work, until the designated or agreed upon TWG leader can take over
- Get the enthusiastic people from the organization to work on the team. During the recommendations step, people prioritize improvements based on their enthusiasm for the improvement area. No commitment is implied at that time, however. Now that the improvement areas have been identified, the same people should be contacted to see if they are still interested. Their commitment and the commitment of their managers must be secured for them to work on the team.
- Plan and conduct a team kickoff meeting with sponsor attending. The first team meeting should be conducted with all TWG members, the SEPG liaison, and the MSG sponsor present to officially start up the TWG. Materials should have been exchanged before this time, but this is the official hand-off of the draft charter and draft tactical action plan from the MSG to the TWG. For other activities that should go on during the first meeting, refer to *The TEAM Handbook*.
- Set up initial schedule for TWG. The TWG should set up an initial schedule of working meetings to get through the next two or three steps.

4.0 The Acting Phase

Overview

The Acting phase is where the improvements are developed, put into practice, and deployed across the organization. The various improvements that the working groups have developed are complete and their value will be "proven" to the organization by piloting them. The management steering group (MSG) and the software engineering process group (SEPG) will be managing and supporting the development, piloting, and deployment of the improvements; their tasks are explained further in Section 6.0 on page 141.

The Acting phase links the mission of the SPI program to improve processes and the mission of the development organization to produce products. It is the culmination of the SPI efforts to this point.

To decide on and introduce improvement, the current organizational practices, used in creating the software work products, must be researched and evaluated so that they are fully understood and documented. It is also important to identify the effects of change in a particular area; these effects should be identified as early as possible so that they can be dealt with in a timely fashion.

To help understand the current practices, techniques are available to model and assess the current practice. These will define and document the "as is" state. To determine the areas for improvement, the "as is" candidate processes must be screened and evaluated. After this evaluation and creation of the "as is" state, the organization needs to define a "to be" state and select from appropriate solution candidates to achieve the "to be" state. After this evaluation and selection, informed decisions can be made for se-

lecting the candidate technology to be used for the improvement. This activity identifies a “to be” state.

The Acting phase is the point in time where you are asking the organization to change the way things were previously done. Selecting the proper method to achieve the “to be” state is important to the overall success of the Acting phase.

This step is the process in which technical working groups (TWGs) develop specific improvements to specific processes. There are two basic approaches to designing solutions:

1. Focus on solving specific problems (problem-centered approach).
2. Incrementally improve a particular process (process-centered approach).

In the first approach, the TWGs focus on a specific problem and develop a solution using pilot projects to validate and refine the solution. In the second approach, the TWGs focus on a particular process and develop incremental refinements to it, again using pilot projects to test out the refinements. There will probably be several of these TWGs running simultaneously. This process represents the typical TWG life cycle for producing process improvements, and so is written from this point of view. The SEPG and MSG are described primarily in Section 6.0 on page 141, which runs in parallel with this step.

Purpose

The purpose of this phase is to develop improvements and solutions to the process issues found during the baselining phase. The key processes and/or problems discovered during the Diagnosing phase have been prioritized and selected during the Establishing phase; the process described in this step is where the actual work of providing refinements to the key processes or fixing those problems is performed. The results of this work will be turned over to the SEPG and MSG, and to project development teams to finally incorporate into their project execution.

Objectives

- Develop or refine the software development processes as prioritized in the action plan.
- Bring line organizations “up-to-speed” on the improvement(s) they will be using.
- Integrate the process improvements with new or existing project development plans.
- Monitor and support the line organizations as they use the new or modified processes.

The TWG will

- plan the improvement project
  - understand the process, including customers needs, and develop refinements to it (process orientation)
  - investigate the problem and develop a solution (problem orientation)
- pilot a solution, validate and refine it
- develop **rollout strategy and plan** template for applying the solution
- evaluate the solution in use
- re-iterate the cycle for further improvements

Education/Skills

Training and skill development for the Acting phase is shown in the following table.

Education/Skills	MSG	SEPG	TWG	Line Managers	Practitioners
New/modified process		X	X	X	X
Change management	X	X	X	X	X
Team development	X	X	X		
Problem solving techniques		X	X		

Commitment

The SEPG must keep working with both the MSG and the line organizations to ensure that the commitment to install and institutionalize the change exists and is strong enough. The MSG must secure the commitment of the development organization and cascade this commitment down to the line organizations. The line organization manager must secure the commitment of the project members to implement the change and get commitment from the SEPG for support during the transition.

Since the TWG receives its charter from the MSG, overall commitment to the TWG charter is assumed. However, additional sponsorship and deeper commitment for the specific changes, staffing, and commitments of pilot projects, and building the capability of the organization to receive the TWG products, is needed. Commitment should come from several distinct groups:

Senior management: The TWG must periodically refresh the commitment of the MSG through progress reports, clarification on issues and goals, and involvement in organization-wide decisions.

Middle management: The TWGs must gain commitment from middle managers for their own time and the time required from pilot projects to develop solutions.

Line management and practitioners: The TWGs will need to establish the commitment and consensus of those who will be implementing the process improvement as part of their product development projects. This requires getting early feedback and continuing to elicit input and gain agreement from the various projects on the content of the process improvement as well as how it is to be initiated and supported.

Communication

The TWGs have to communicate with project personnel, project management, subject matter experts, along with the SEPG and MSG. In addition, the TWG will be working with solution providers to get the best solution in the organization.

Specific communications include the following:

- *TWG to SEPG:* primarily status updates and requests for information and assistance.
- *TWG to MSG:* primarily status updates and requests for resource-level approvals; occasionally requests for arbitration/decisions affecting the organization that the TWG or the SEPG cannot make.
- *TWG to **target groups:*** The TWG must elicit requirements and feedback from the eventual target groups to ensure that the needs of these groups are met by the eventual solution. In addition, the TWG should solicit interest in pilot participation from the affected target groups.
- *TWG to pilots:* For the TWG to get the appropriate feedback to refine the process improvement solution, significant communication is required to ensure the proper execution of the pilot project.

The SEPG will be primarily responsible for insuring technology transition of the change into the line organization. The MSG and SEPG communicate the rollout strategy and plan and specific process changes to the development organization. The SEPG works closely with the line organization to integrate the changes into the line organization's plans and activities.

Entry Criteria

- TWG charter and tactical action plan template from MSG/SEPG.
- Process maturity issues from the Establishing phase.
- Related recommendations and "low-hanging fruit" (quick-fix, quick-return improvement projects) from baselining step(s).
- High-level process descriptions from process baselining step(s).

- Measurable goals identified during the Establishing phase.
- Key process metrics from metrics baselining step.

Exit Criteria

- The rollout strategy and plan is fully executed, or being executed.
- Solution packaged properly and turned over to SEPG.
- Long term support has been arranged for.
- The process improvement has begun to be institutionalized in the line organization.

See Figure 4-1 on page 99 for a pictorial representation of the tasks associated with the Acting phase of the IDEAL model.

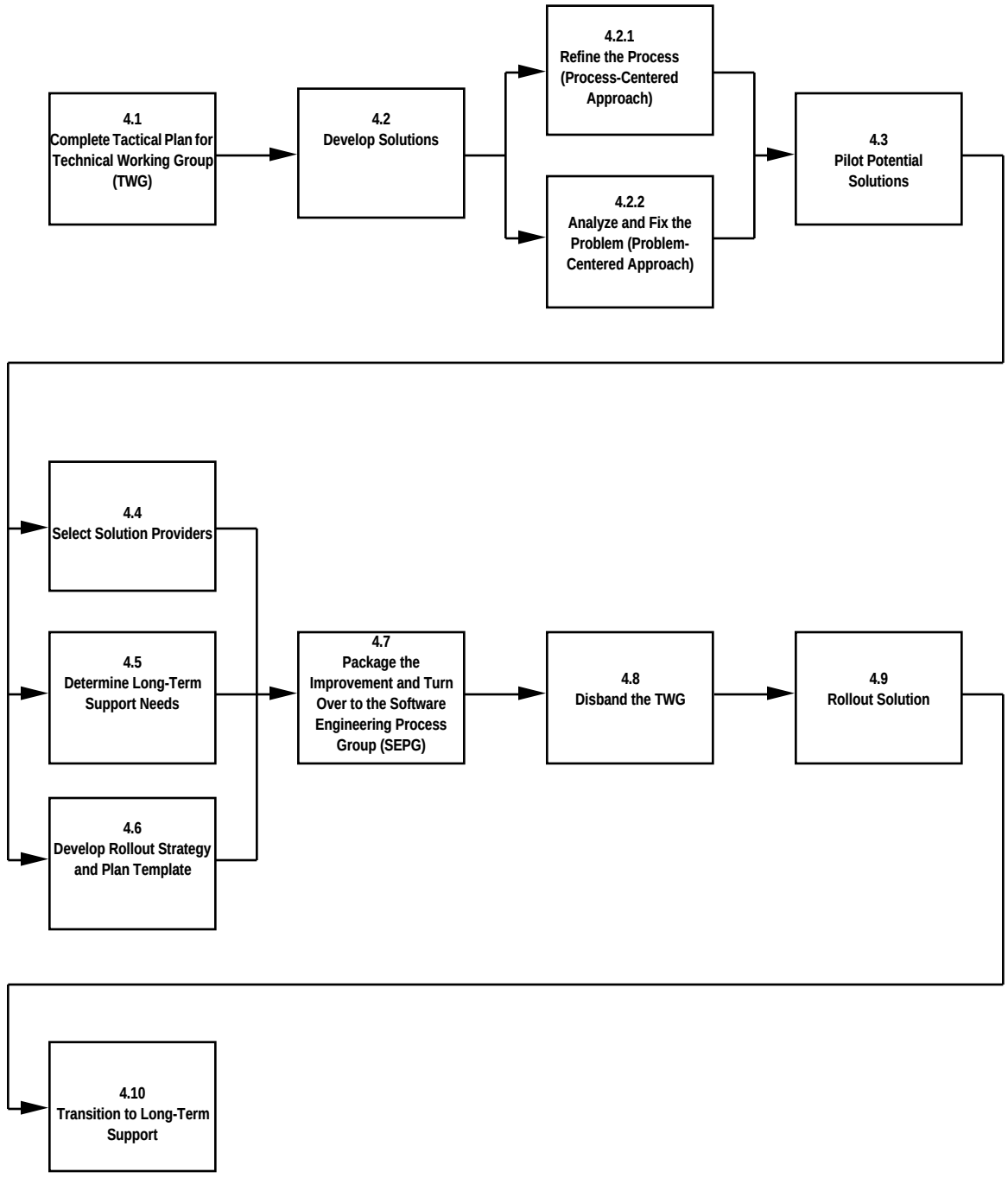

Figure 4-1: Process Flow for Acting Phase

Tasks

The tasks for the Acting phase are shown in the table below.

4.1 Complete Tactical Plan for Technical Working Group (TWG)

Purpose

The purpose of this step is to complete a tactical plan from a template that is supplied to the TWG by the MSG. The completed plan will be approved by the MSG. The team's early efforts should be focused on narrowing the scope of the charter to the specific improvement on which they will work.

Defining the scope of the effort is a very important activity. Too many times improvement teams have taken on too big a scope and have failed to complete the effort. A guideline for determining the scope of the TWGs project should be something that can be accomplished in 6 to 9 months or less. Improvement teams are trying to strike a balance between showing early results to the organization and coming up with the best solution. There is nothing wrong with taking a two or three step approach to developing an improvement, intermediate benefits can be shown along the way.

Objectives

- Complete the tactical action plan sections not specified by the MSG, and fill in other areas of the plan.
- Review and narrow the scope of the project, if necessary, to something that can be done in a relatively short amount of time. (6 - 9 months)

Entry Criteria

Tactical plan template from MSG.

Exit Criteria

Tactical plan approved by MSG.

Tasks

- Review draft tactical plan with MSG sponsor and SEPG liaison.
- Review data from baselining phase with SEPG liaison.
- Develop task sorting and selection criteria.

- Explore problem area to get preliminary directions for the team.
- Create work breakdown structure (WBS) for the TWG.
- Organize WBS tasks into a schedule with milestones and deliverables.
- Review and refine the tactical plan with MSG sponsor and SEPG liaison.

4.2 Develop Solutions

Purpose

This is the step where solutions to the process issues found during the Diagnosing phase are developed. The purpose of this task is to create solutions to the problems or processes that the organization has determined are necessary to meet the business needs of the organization.

The solution selected should be compatible with the organization's culture so that it will be readily accepted and easier to institutionalize.

Objectives

- Investigate alternative solutions to process issues discovered during the baselining activity.

Select solution that best fits the business needs and culture of the organization.

Entry Criteria

- Baselining activity completed.
- TWGs established.
- TWGs trained.
- Final briefing from baselining activity available.
- Final Findings and Recommendations Report available.
- Policies, procedures, guidelines, etc. available.

Exit Criteria

- Solutions selected and documented.
- Plan template for piloting the solution developed.

Subtasks

The subtasks for this task are shown in the table below.

4.2.1 Refine the Process (Process-Centered Approach)

Purpose

The process-centered approach deals with understanding a specific key process identified during the baselining phase and applying incremental refinements to the process. This approach is useful for achieving long-term improvements in the process. However, because of the immediate pressures and uncertainties typical of lower level maturity organizations, it is difficult to maintain this focus in such organizations. Sustaining a process-centered approach requires strong management commitment and organizational momentum and enthusiasm. Even with the requirement for strong management commitment, the problem-centered approach is recommended for first-time process improvement programs.

Objectives

- Understand the existing process.
- Refine the existing process to eliminate errors and reduce variations.
- Set up a continuous improvement cycle for the process.

Entry Criteria

- TWG formed and trained.
- Process baseline and maturity issue data from the baselining phase.
- Tactical action plan.

Tasks

- Identify process stakeholders and understand their needs.
- Determine current process scope / boundaries / context.
- Describe the desired state of the process (the “to be”).
- Analyze the gap between the “as is” and “to be” states.
- Create refined process.
- Determine process modeling objectives.
- Model the new process.

- Specify process metrics.
- Implement the process.

Exit Criteria

Solution components identified: process descriptions, procedures, metrics, methods, and tools.

4.2.2 Analyze and Fix the Problem (Problem-Centered Approach)

Purpose

The problem-centered approach is distinct from the process-centered approach in that it is more useful for easily identifiable problems and can provide results faster than the process-centered approach. When problems become complex or solutions unwieldy, however, the results of the problem-centered approach are often overtaken by other problems that crop up when early problems are fixed. Because it will get the momentum up and keep enthusiasm alive, the problem-centered approach is useful for getting a software process improvement (SPI) program started. However, the process-centered approach will be more useful for long-term results.

Objectives

Develop solutions to specific problems.

Entry Criteria

- Problem description and issue data from the baselining phase.
- Tactical action plan.

Tasks

- State the problem.
- Define solution goals.
- Identify constraints.
- Analyze the problem.
- Generate and select alternatives to address problem.
- Define solution metrics.
- Select best solution from alternatives discovered.

Exit Criteria

Solution components identified: process descriptions, procedures, metrics, methods, and tools.

4.3 Pilot Potential Solutions

Purpose

Pilot projects are used to test out the solutions in both the process-centered and problem-centered approaches. The solutions will require some tailoring and refinement to fit them into projects across the organization, and the pilots will help determine the tailoring needs and guidelines for the rest of the organization. Several pilots may be run for a solution, and there may be several iterations between the solution development and piloting steps to get the solution ready for deployment across the organization.

Objectives

- Verify the solution in a real project in the organization.
- Capture lessons learned and results of pilot to refine the solution and the installation of the solution.

Entry Criteria

- Solution components: process description, procedures, metrics, methods, and tools.
- Training and installation needs identified and planned.

Exit Criteria

- Completed pilot.
- Pilot project completion criteria are met.
- Lessons learned and results of pilot have been captured and preserved by TWG.

Tasks

- Develop pilot selection and completion criteria.
- Identify potential pilot projects.
- Select pilot project team.
- Train pilot project team.
- Install solution in pilot project.
- Execute and monitor pilot project.
- Evaluate results of pilot.
- Capture lessons learned from pilot.

4.4 Select Solution Providers

Purpose

There may be several sources of support for the process improvement solution, some competing, others complementary. Solution providers can be internal or external to the organization, and solution providers could be the TWG or some subset of the TWG. Given the organization's varying needs, the TWG must determine the best source for providing the solution. During this phase the TWG should work closely with the SEPG to use established and vetted solution providers.

This step can run in parallel with the solution creation steps. The solution provider(s) may be part of determining the solution, or in some cases the selection criteria for choosing providers may not be determined until well into pilot testing the solution. When several tools are competing, the TWG must establish working relationships with various vendors to get the best solution for the organization.

Objectives

Investigate various providers of solutions and their track records to find ones that best match the needs of the organization, both short and long term.

Entry Criteria

TWG has selected or developed a solution for the process issue at hand.

Exit Criteria

Designated solution provider(s) for the solution are ready to implement and provide support.

Tasks

- Obtain contacts for potential providers of solutions (from SEPG).
- Contact providers and arrange briefing sessions.
- Develop selection criteria based on organization needs and range of possibilities among providers.

- Narrow down the set of providers to one or two that best meet needs and are ready to work with the organization.
- Develop contracts with solution providers.

4.5 Determine Long-Term Support Needs

Purpose

Long-term solutions will require long-term support. As the solution is implemented in other parts of the organization, people will have to be trained, problems may crop up, and additional tailoring may be needed. This step identifies the requirements for long-term support in terms of knowledge and skills required, how defects are fixed, installation and configuration consulting, etc. The improvement should be planned to last for a few years (possibly as part of some larger improvement effort). Ongoing support for any tools, methods, classes, materials, etc., should be planned in parallel with the solution development step.

Objectives

- Identify long-term support needs and potential sources for support.
- Plan internal long-term support mechanisms.
- Secure funding for long-term support.

Entry Criteria

List of recommended support providers from SEPG.

Exit Criteria

- Specific support provider(s) chosen.
- Support contracts drafted.

Tasks

- Work with support providers to satisfy needs of TWG and pilot solution.
- Refine TWG and pilot needs to enable best possible support for entire organization.

4.6 Develop Rollout Strategy and Plan Template

Purpose

Once the solution has been developed and piloted, and the short- and long-term support needs have been addressed, the solution will be ready to roll out to the organization. The TWG will create a rollout plan template that gives guidance to the development projects that will be installing the process improvement. The plan will include

- what training they need
- what tools and methods to acquire
- installation steps
- information on how to get support, etc.

This plan will be used as a template by the project to integrate with their own project plans and by the MSG to integrate the improvement into the overall **organization strategic plan for SPI**.

Objectives

Create rollout plan template for the solution, that can be customized by the projects during their rollout of the solution.

Entry Criteria

- Successful pilot implementation.
- Generic rollout plan template.
- Tailoring guidelines for developing rollout plan from the template.
- Guide for developing/integrating rollout plans.

Exit Criteria

Rollout plan template reviewed and approved by organization receiving solution.

Tasks

- Using generic templates, create the rollout plan for this particular solution.
- Review rollout plan template with MSG/SEPG for approval.

4.7 Package the Improvement and Turn Over to the Software Engineering Process Group (SEPG)

Purpose

During solution development the TWG has probably developed several intermediate products and artifacts. These must be collected into a package that can be turned over to the SEPG for long-term maintenance and support. (This task will be much simpler if the TWG is doing this as it goes along.)

Objectives

- Collect and clean up all intermediate products and artifacts.
- Package products and artifacts for archival with the SEPG.

Entry Criteria

- Process improvement(s) are ready for distribution.
- Long-term support arrangements are in place and solution providers are ready to implement solutions throughout the organization.
- Artifacts from the TWG activities are available (minutes, notes, plans, templates, diagrams, charts, etc.).
- Training and support is available for the organization.

Exit Criteria

- All necessary artifacts are collected in a single place for long-term support.
- SEPG accepts the package.

Tasks

- Identify various intermediate products and artifacts the team has produced.
- Collect clean copies of each product and/or artifact.
- Write descriptive material for those intermediate products and artifacts for which it is needed.
- Organize and catalog all the artifacts.
- Bind the products and artifacts into one solution package.

- Review solution package content with the SEPG.
- Archive the package with the SEPG, adding to its database of process improvement information and beginning the maintenance process on the solution package.

4.8 Disband the TWG

Purpose

As a final task, the TWG should also do a final lessons learned report that will go to the SEPG and MSG to help improve the process for running and managing TWGs during solution development. The TWG has now completed its tasks.

A reward of some type given to the team for accomplishing its work is a strong show of sponsorship for SPI and an item for communication to the rest of the organization.

Finally, the team should celebrate what it has accomplished.

Objectives

- Gather lessons learned from this effort.
- Celebrate the accomplishments of this team.

Entry Criteria

All improvements packaged and accepted by the SEPG for long-term support.

Exit Criteria

- Lessons learned report delivered to SEPG.
- All team members' efforts recognized and rewarded.

Tasks

- Review the improvement project. Gather lessons learned from the TWG to improve the process of improving processes.
- Celebrate the completion of the activity.
- Dissolve the team.

4.9 Rollout Solution

Purpose

The purpose of this step is to install the proven solution across the organization. The solution has been developed and proven by pilot testing with a project. Now the solution needs to be installed across the organization.

Objectives

Install solution across the organization.

Entry Criteria

- A rollout strategy and plan has been created and approved by the MSG and the development organization's senior management (it helps if these are same).
- Specific process improvement materials are ready for development teams to use.
- Training and ongoing support has been arranged for process improvement solution.

Exit Criteria

Solution installed across the organization.

Subtasks

The subtasks for this task are shown in the table below.

4.9.1 Brief Entire Organization

Purpose

SEPG and MSG process owners brief the development organization on the change and the strategy for implementing the change. The development organization should have been kept informed on the progress of the working group during the solution development phase. The purpose of this briefing will be to announce to the organization the formal adoption of the change (or set of changes), explain the rationale for adopting the change, and explain the strategy for deploying the change across the organization.

The MSG process owner is the primary sponsor for the change and will give (or lead) the briefing to show maximum support for the changes.

Objectives

- Inform the organization about any changes in policy because of the adoption of process improvement(s).
- Inform the organization about the strategy for adoption, the benefits of the change, and the linkage to the organization's business goals and needs.

Entry Criteria

- Solution has been successfully piloted.
- Briefing kit/information completed.
- Deployment strategy completed.

Tasks

- Plan and schedule briefings. The briefings should be planned and scheduled to cover the entire organization.
- Conduct briefings.
- Gather feedback from briefing participants.
- Revise future briefings based on feedback.

Exit Criteria

- Organization briefing completed.
- Lessons are learned from the organization on the deployment strategy.

4.9.2 Refine Rollout Strategy and Plan

Purpose

Based on feedback from individual projects and the line organization as a whole, the SEPG and MSG process owners modify the rollout strategy and plan to better accommodate the organization's needs.

Objectives

- Clarify and refine rollout strategy and plan, communicate to organization.
- Incorporate lessons learned from the pilot deployment.

Entry Criteria

- Feedback has been provided from strategy briefings with the entire organization to modify the rollout strategy and plan.
- Rollout strategy and plan template completed.

Tasks

- Gather feedback from other tasks in this section.
- Distill lessons learned and desired modifications from feedback.
- Incorporate lessons learned in rollout strategy and plan.
- Implement next task (or same task on next project) with new rollout strategy and plan.
- Communicate broad changes to entire organization.

Exit Criteria

- Rollout strategy and plan is fully refined. (Refinement continues in parallel with the other tasks in this phase.)
- Revised rollout strategy and plan completed.

4.9.3 Brief Project

Purpose

SEPG and MSG process owners brief individual organization projects on the specifics of the change (what it is, why it is needed, why they are to do it at this specific time, etc.).

More detail about the process improvement should be provided to the organization project at the point when it will be expected to adopt the change (projects will probably adopt at different times and rates).

Objectives

Describe how the process improvement is expected to fit into the project.

Entry Criteria

- Briefing(s) of the entire organization have been completed.
- Rollout strategy and plan template completed.

Tasks

- Plan and schedule project briefings.
- Tailor briefing to specific project and set of changes.
- Conduct briefings.
- Gather feedback from briefings to refine deployment.

Exit Criteria

Project understands need for change and content of changes.

4.9.4 Tailor Project Rollout Strategy And Plan

Purpose

SEPG and project managers in the organization fill in the rollout strategy and plan template for the specific changes to be integrated, in the context of the overall line organization's plan(s). The process improvement is tailored to the project's environment and circumstances. There will be additional tailoring as the project continues to use the improvement.

Objectives

Tailor the process improvement plans to fit the project.

Entry Criteria

Project briefings completed.

Inputs

Rollout plan template.

Tasks

- Using rollout plan template, fill in appropriate dates, resources, costs, names, etc., specific to this project's installation.
- Review the tailored rollout plan with the project, getting buy-in from affected targets for implementation.
- Review tailored rollout plan with MSG.

Exit Criteria

- Project agreement with tailored rollout plan.
- Tailored rollout plan.

4.9.5 Train Project

Purpose

The solution developed will probably require new skills and knowledge to be acquired by the line organization. To provide the maximum benefit to the line organization members, training and practice must be integrated into the project plans. SEPG and line organization managers arrange training and detailed briefings for line personnel in new process, methods, tools, etc.

Although the tasks 4.9.5 (Train Project), 4.9.6 (Install Improvement), and 4.9.7 (Evaluate Deployment) appear to be sequential, they are usually done somewhat in parallel, and may take some iteration. For example, a tool may have to be installed for training to effectively be provided for it. Additionally, it may not be possible to identify certain needed skills until their absence becomes apparent. Although the order of these tasks represents an ideal situation, the actual implementation must be determined by the existing situation and environment.

Objectives

- Plan the training for the project.
- Schedule instructors and briefers.
- Set up support relationships for the project.

Entry Criteria

- Project agrees to rollout plan.
- Installation plan for project completed.
- Training resources are available to project.

Tasks

- Assess project skills and knowledge in area of change.
- Plan curriculum to meet skills and training needs of people in the project.
- Schedule courses and enroll people from the project.
- Conduct courses.

- Reassess project skills and knowledge; retrain as necessary.

Exit Criteria

- Project is trained in specifics of this process change.
- Project has ongoing support for installing and using changes.
- Training plan is completed.
- Support agreements include project

4.9.6 Install Improvement

Purpose

Before a new tool, method, or process can be used, the associated supporting environment must be installed. Various projects in the line organization must tailor the solution to fit their environments and needs. The installation is when the tailoring is performed; the tailoring is planned for in Step 4.9.4 on page 119.

For lower maturity organizations in which there is more variation across the line organization, more tailoring to accommodate individual needs may be required. As the organization moves up the maturity ladder, less local tailoring will be required for organization-wide improvements.

Objectives

Ensure that the local project installs and can successfully use the process improvement.

Entry Criteria

- Installation plan for project is approved.
- Project included in support contracts.
- Installation plan and support plans for the project are completed.
- Project trained in specifics of process improvement
- Tools, artifacts, and documentation to support implementation of process improvement.

Tasks

Specific installation tasks vary widely depending on the nature of the change. New tools require software upgrades, installations, file system changes, etc., while a new procedure requires an update to hard- and soft-copy documentation. The tasks listed here are very generic and shouldn't limit the actual installation.

- Plan and schedule installation, upgrades, etc. to occur at a time when they won't affect critical project tasks.
- Carry out installation, upgrade, etc., verifying correct new operation in the given environment.

- Walk through new operation with affected people in the changed environment. Clean up any problems associated with the installation.
- Run through new operation at normal speed. Clean up any problems associated with the installation.
- Review installation with project for final approval.
- Update/install hard and soft copy documentation.

Exit Criteria Project has sufficient support for the improvement.

4.9.7 Evaluate Deployment

Purpose

The line organization conducts an evaluation of the rollout to gather lessons learned regarding deployment of the new process during their project, giving the feedback to the SEPG to further refine the installation and deployment processes. By providing feedback to the SEPG, the methods and techniques used during the implementation can be incorporated into the next round of improvements.

Objectives

Gather lessons learned from deploying improvements and apply to future deployments.

Entry Criteria

- Organization has fully deployed the improvement and has been using it for a few cycles.
- Installation plans for projects are completed.
- Process metrics reports are completed.
- Organization rollout strategy and plan are completed.

Tasks

- Plan and schedule lessons learned meeting(s).
- Survey organization to collect top-level lessons, issues, and remaining actions.
- Compile lessons learned survey results.
- Conduct lessons learned meeting to clarify findings.
- Package lessons learned findings and review with organization.
- Revise generic templates for rollout strategy and plans and installation plans.
- Develop action plan to resolve outstanding issues and finish remaining actions.
- Execute action plan and review results with organization

Exit Criteria

- Lessons learned from solution rollout captured.

- SEPG has revised generic rollout strategy and plans and rollout plan templates.
- Lessons learned report is completed.
- Revised generic rollout strategy and plans and rollout plan templates are completed.

4.10 Transition to Long-Term Support

Purpose

The process improvement should not require constant vigilance; if it does, it should to be retuned (or rethought). The development team should be able to continue without a lot of guidance and support, but should be able to call in expertise when needed. When the line organization demonstrates that it can repeatedly execute the new process, SEPG involvement falls back to an on-call support role, and the long-term support group takes over.

Objectives

Support the line organization in normal use of the process.

Entry Criteria

- Changes rolled out to all projects in the organization.
- Long-term support agreements and funding in place.

Exit Criteria

New environment makes existing contracts obsolete.

Tasks

- Line organization calls on long-term support provider instead of SEPG when problems arise, new training is needed, specific tailoring is required, etc.
- SEPG monitors long-term support provider to ensure adequate support for line organization.
- MSG periodically reviews long-term support to ensure that proper funding and contractual commitments are being met.

5.0 The Leveraging Phase

Overview

Now that the organization has completed one cycle through IDEAL it is necessary to review what happened during that cycle and prepare for the next cycle through the model.

Rather than re-enter IDEAL at the Initiating phase on subsequent cycles through the model, by performing the activities of this Leveraging phase you will reenter IDEAL at the Diagnosing phase. The Leveraging phase, in addition to preparing for the next cycle through IDEAL, gives you the opportunity to "tune-up" the software process improvement (SPI) process before starting again.

There were probably some false starts, omissions, and some activities you would like to do over that occurred during the initial cycle through IDEAL. Since you have kept track of the lessons learned from each of the SPI activities you will now apply them during the Leveraging phase to make the SPI process work better during the next cycle through the IDEAL model.

Purpose

- Review and analyze lessons learned from prior phases.
- Incorporate improvements into the SPI processes.
- Review motivation for SPI.
- Review and evaluate goals.
- Evaluate sponsorship and commitment.
- Develop plan to provide continuing guidance to the SPI program.

Objectives

- Incorporate lessons learned from previous phases into SPI approach.
- Gain visibility into value of SPI.
- Reaffirm continuing SPI sponsorship.
- Establish/adjust high level goals for next cycle.
- Determine new or additional baselines that may be necessary.
- Create a plan to guide the organization through the next cycle.

Education/Skills

Training and skill development for the Leveraging phase is shown in the following table.

Education/Skills	MSG	SEPG	TWG	Line Managers	Practitioners
Team Development	X	X			
CMM for software	X	X		X	X
SPI skills	X	X		X	
Planning skills	X	X			

Commitment

The commitment expectations for the Leveraging phase are similar to those of the Initiating phase. Management must provide the business need for continuing the SPI activities and must be willing to commit the necessary resources for the SPI effort.

Communication

As with commitment, the communications aspect of the Leveraging phase is very similar to that of the Initiating phase. One difference, though, is that there should now be a greater amount of information to communicate now that you have completed one cycle of IDEAL.

Some of the things that you should communicate to the organization are

- results from the first cycle through IDEAL
- enhanced business objectives and goals
- changes that may have occurred to the infrastructure
- updated/revised approach to SPI

Entry Criteria

- A cycle through the previous phases of the IDEAL model has been completed.
- Lessons learned reports from each of the previous phases are available.
- Artifacts produced during SPI implementation are available.

Exit Criteria

- Lessons learned are analyzed and improvements incorporated into SPI processes.
- Sponsorship and commitment have been reaffirmed with senior management.
- High level goals are established for the next cycle.

See Figure 5-1 on page 130 for a pictorial representation of the tasks associated with the Leveraging phase of the IDEAL model.

Figure 5-1: Process Flow for Leveraging Phase

Tasks

The tasks for the Leveraging phase are shown in the table below.

5.1 Gather Lessons Learned

Purpose

The purpose of this step is to insure that all of the lessons learned data is available for review prior to starting the next cycle through IDEAL. A reasonable amount of time has passed since you last went through the prior phases of IDEAL, possibly as long as 18 to 24 months. Without the documented lessons learned that were gathered during each phase it will be hard to remember the activities that occurred during previous phases.

Hopefully, you have been gathering lessons learned throughout the SPI activity and this data resides in the organizations process database. If it doesn't, it needs to be gathered from wherever it may reside.

Objectives

- Insure that all lessons learned information regarding the activities performed during the previous cycle are available for review.
- Refresh your memory regarding the activities from the previously completed phases of the IDEAL model.

Entry Criteria

Acting phase has been completed for some or most of the TWGs.

Exit Criteria

Lessons learned from previous phases of IDEAL are available.

Tasks

- Gather lessons learned from previous SPI activities.
- Interview SPI process participants to get their perspectives on previous SPI activity.
    - technical working group (TWG) leaders, members
    - pilot project personnel
    - management infrastructure members

5.2 Analyze Lessons Learned

Purpose

The purpose of this step is to make sure that the process you are using for SPI is the best that you can make it.

Now that you have gathered all of the information and artifacts from the previous cycle through IDEAL it is time to reflect on the processes you followed, or didn't follow. The purpose of this activity is to learn from the mistakes or omissions that you may have made in the previous cycle and modify and change your approach so you don't repeat them.

You are looking for ways to make things better for all on this next cycle through the model.

Objectives

- Analyze past practices and processes for improvements to make to them to make the next cycle through IDEAL work better.
- Consider deleting and replacing processes that did not work well.
- Consider adding new processes that will make SPI work better.

Entry Criteria

- Completion of the previous phases of the IDEAL model accomplished.
- Lessons learned, artifacts and other information regarding the previous cycle through IDEAL readily available.
- Data from the interviews of SPI participants regarding the previous SPI cycle are available.

Exit Criteria

- Review and analysis of the activities performed in the previous IDEAL cycle completed.
- Adjustments or plans for adjustments in the SPI approach confirmed.

Tasks

- Review lessons learned reports.
- Review artifacts produced.
- Review overall approach to SPI.
- Review communications activity.
- Review interview results from SPI participants regarding previous SPI cycle.
- Review effectiveness of the SPI infrastructure that was in place.
- Interview all levels of management to include their inputs.
- Survey other organizations and the literature to see what others are doing regarding the process for SPI.

5.3 Revise Organizational Approach

Purpose

The purpose of this step is to make the next cycle through the SPI process more effective and efficient. Any enhancements you can make to the SPI process will allow you to make improvement changes more effectively, reduce resistance to change and allow SPI to proceed at a faster pace.

Objectives

- Develop more effective and efficient SPI process.
- Reduce resistance to SPI.
- Insure effective sponsorship for SPI.

Exit Criteria

- SPI approach modified for entry into the next cycle through the IDEAL model.
- The documented approach to SPI has been revised to reflect the corrections and additions resulting from the review and analysis of lessons learned.

Entry Criteria

- Lessons learned have been reviewed and analyzed.
- Interviews with participants have been conducted.
- Industry trends have been reviewed.
- Artifacts (plans, procedures, etc.) from previous SPI cycle are available.
- Results from the analysis of lessons learned and the results from participant interviews regarding the previous SPI cycle are available.

Tasks

- Revise the previous approach to SPI.
- Document the new approach.
- Make changes to infrastructure if necessary.

5.4 Review Sponsorship and Commitment

Purpose

As you have probably recognized during the previous cycle, sponsorship and commitment are critical to the success of SPI. As you did the first time through the Initiating phase, make sure you have sufficient sponsorship and commitment to support the SPI program.

Objectives

- Insure that management is committed to the SPI effort and will continue to provide the sponsorship and commitment necessary for the program to succeed.
- Insure that resources will be available to continue the SPI program.

Entry Criteria

Revised approach to SPI agreed upon and documented.

Exit Criteria

- Management has confirmed continuing sponsorship and commitment to the SPI program.
- Management has agreed to provide resources and oversight to the SPI program.

Tasks

- Review commitment and sponsorship levels required with senior management.
- Review revised SPI approach with senior management.
- Review resources required with senior management.

5.5 Establish High Level Goals

Purpose

As in the Initiating phase, general, high-level goals need to be established. These goals will be made more specific during the action planning activity of the Establishing phase.

Clearly defined, measurable goals are necessary to provide guidance and to assist in developing tactics for improvement. They also allow objective measurement of the improvement results.

Objectives

- Refine the long term goals.
- Refine the measurements and the measurement process to objectively determine goal satisfaction.
- Link the SPI program to the organization's vision and business needs.

Entry Criteria

- Sponsorship and commitment have been reaffirmed.
- Updated SPI process documented and agreed upon.
- SPI strategic goals from last cycle is available.
- Lessons learned regarding goal setting from past improvement efforts are available.

Exit Criteria

- General goals for SPI reviewed and updated/defined.
- SPI program linked to the organizations vision and business needs.
- High level goals for next cycle through IDEAL have been agreed upon and documented.

Tasks

- Review goals from previous cycle through IDEAL to determine if they are still applicable.
- Define new goals as appropriate and in concert with the organization's vision, business needs and strategy.
- Review lessons learned from prior cycle goal setting activities.

5.6 Develop New/Revised Software Process Improvement (SPI) Proposal

Purpose

Until the strategic action plan is updated or recreated, the SPI program needs some initial guidance. The purpose of this step is to create a plan to guide the program up to the action planning steps.

The activities will be very similar to those performed in the Initiating phase when the initial proposal for SPI was created.

Objectives

Provide guidance to the SPI program until any necessary baselines are completed and a new action plan is created.

Entry Criteria

- Sponsorship and commitment reaffirmed.
- High level goals established.
- Infrastructure in place and operating.

Exit Criteria

A plan to provide guidance for the SPI program is documented and approved.

Tasks

Develop plan to provide initial guidance for SPI program.

5.7 Continue With SPI

Purpose

The purpose of this activity is to move into the main part of the SPI program and start the continuous cycle of the process improvement program.

Objectives

Transition from the Leveraging phase into the Diagnosing phase.

Entry Criteria

- Revised/updated approach to SPI documented and approved.
- SPI goals reviewed/updated.
- Sponsorship and commitment has been reaffirmed.
- Infrastructure in place and operating.

Exit Criteria

Agreement and approval to continue SPI program.

Tasks

Obtain senior management approval to continue the SPI program.

6.0 Manage the Software Process Improvement Program

Overview

Software process improvement will be a significant undertaking for an organization. To coordinate the many activities that will occur in the course of a software process improvement (SPI) program requires an effective infrastructure for support. Additionally, the infrastructure must be able to react in a timely manner to the demands of the SPI program.

At the initiation of the SPI program, an initial SPI infrastructure was put in place to manage the activities that the organization would be undertaking during its SPI program. A good time to review how well this infrastructure has performed is after some time has passed and the initial accomplishments—building support, obtaining sponsorship, gaining commitment, completing the baselining activities, and completing action planning—have been achieved.

Some questions to answer about the performance of the infrastructure that was initially put in place are

- Has the infrastructure effectively linked the SPI program to the organization's mission and vision?
- Has the infrastructure been able to obtain and allocate sufficient resources to ensure timely accomplishments?
- Has the infrastructure monitored the SPI program properly and provided guidance and correction as necessary?

As the organization moves from the initial baselining phase of the SPI program into the improvement implementation phase, it is critically important to have in place a strong, responsive, and supportive infrastructure.

The improvement activities will not occur in a vacuum nor will they occur in a serial fashion. Once the SPI program is under way, there will be multiple improvement activities occurring across different organizational units. For example, there may be technical working groups (TWGs) addressing configuration management, requirements management, project planning, and peer reviews all simultaneously. The infrastructure must keep track of all this and be prepared to provide the required oversight and guidance to the efforts.

The supporting infrastructure must be aware that TWGs can and probably will operate in parallel. At any time, the improvement infrastructure must be prepared to

- Offer support for a technology being introduced.
- Coordinate training resources.
- Continue to build and provide sponsorship.
- Provide planning expertise.
- Assess organizational impact.
- Show lessons learned.

In short the infrastructure must perform many management functions for the organization as it progresses with the SPI program.

Tasks

The tasks for this phase are shown in the table below.

6.1 Setting the Stage for Software Process Improvement (SPI)

Purpose

Once the SPI program is started, management has the most challenging and, in some sense, the most rewarding responsibility. Significant challenges will come from the organization's resistance to change, cost, schedule demands and inevitable slow progress that seem to characterize all improvement efforts. Management must keep the SPI program focused on improvements connected to the organization's vision and mission.

To keep the SPI program focused over the long term, a management infrastructure will be required. This management infrastructure will be required to make changes of focus and adjustments to priorities many times as the effort proceeds. These changes will be driven by both internal and external factors, changes in the marketplace, shortage of resources, critical skill availability, availability of new or improved technologies, and any of a host of other factors.

One of the biggest challenges that the management infrastructure will have to deal with is the organization itself. The organization has a culture, and the SPI program in some cases will be asking this culture to change. Guiding an organization through a change in culture takes time.

A significant challenge related to dealing with the organization is management itself. Management must be able to recognize that they are a significant part of the organizational culture and that they may also be required to change as the organization changes.

Managers must be able to divorce themselves from cultural biases and organizational biases and be aware of the differing perspectives from different groups that make up the organization. They must work to integrate these different groups into the SPI program, building consensus and support for the SPI program as they proceed.

As the organization progresses through the SPI program, problems sometimes arise when new or different technologies are introduced to effect the improvements.

The difficulty in introducing a new technology lies not in the fact that the technology is new but in the fact that the technology will require change. Change is the culprit. As new or different technology is introduced during the SPI program, people will be asked to do their jobs differently, work with different equipment, work with different tools, or possibly change positions within the organization. People will be asked to move out of their comfort zone into something that is unknown to them.

It is a very common occurrence within an improvement effort to require people to change the way they currently do their work, and it is also a very common and natural for people to resist the change. Why should they change something that they have grown comfortable with for something that is unknown to them? The management infrastructure should be prepared for and expect resistance to the improvement initiative. Regardless of whether the improvements are viewed as a good thing or a bad thing, there will still be change and there will be resistance.

Being able to recognize that this resistance to change is occurring and being able to deal with it effectively is critical to the success of the SPI program.

The type and amount of resistance will vary from organization to organization, depending on the culture that exists within the organization.

Resistance will occur in two forms: overt and covert. It is easier for management to deal with the overt resistance, as it is out in the open and easily recognized. The harder challenge will be to surface covert resistance so that it is more recognizable and easier to deal with. Being aware that resistance will occur—that it is not always on the surface—and being able to recognize it when it is surfaced will make

things go a lot smoother. However managing the SPI program will still be a difficult challenge.

Objectives

- Establish priorities for the SPI program.
- Approve SPI strategic action plans.
- Allocate resources.
- Monitor improvement progress against plan.
- Develop reward system.
- Provide continuing, visible sponsorship.

Entry Criteria

- Commitment made to establish and implement a SPI program.
- Proposal for SPI program completed and approved.
- Resources for SPI program authorized.
- Business needs identified.

Tasks

- Review and select baselines that are needed.
- Review resource requirements for the SPI program.
- Tailor guide activities as appropriate for the organization.
- Develop sponsorship activities.
- Introduce concepts of managing technological change and technology transition.
- Obtain training on ability to recognize and deal with resistance to change that will present themselves to the improvement program.

6.2 Organizing the SPI Program

Purpose

As a SPI program gets under way, an infrastructure must be developed and put in place. This infrastructure will have the responsibility of providing guidance for the SPI program.

In most cases there will be three components to the organization's SPI infrastructure:

1. Software engineering process group (SEPG).
2. Management steering group (MSG).
3. Technical working group (TWG).

These are generic names and may vary from organization to organization. The components of the infrastructure and their relationship to each other are largely determined by such factors as organization size and geographical diversity. Figure 6-1 below is an illustration of the components of a typical SPI infrastructure.

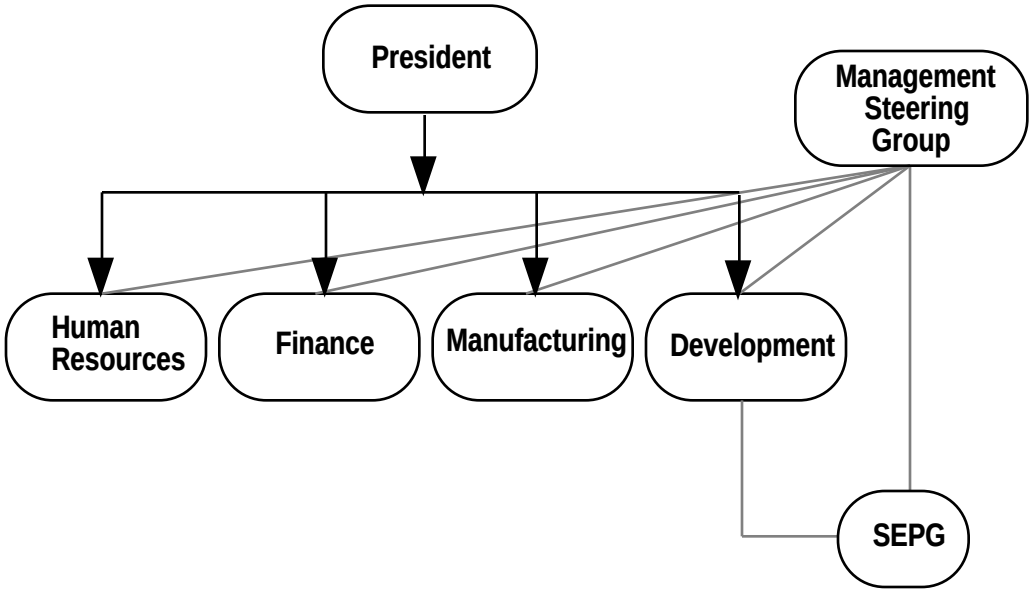

Figure 6-1: Components of a Typical SPI Infrastructure

First and most important is the SEPG, sometimes called the *process group*. The SEPG performs many functions for the organization in its SPI programs. The SEPG

- helps to sustain support for the SPI program in an environment of change
- builds and reinforces sponsorship
- nurtures and sustains the individual improvement activities
- ensures coordination of these activities throughout the organization

The SEPG is chartered by the MSG. This charter acts as the contract between management and the SEPG. The charter typically outlines the role, responsibility, and authority of the SEPG.

It cannot be emphasized too strongly that the SEPG is *not* the implementor of the improvements. The role of the SEPG is that of a facilitator, helping to guide the process improvement activity. The SEPG also plays a support role, helping the projects with any difficulties that they may encounter as they implement process improvement.

In most cases, members of the SEPG are recruited from the organization's existing staff of software engineering professionals. The support that the organization's management demonstrates for the SPI program will influence the ability to recruit quality people for membership in the SEPG.

Membership in the SEPG is on both a full-time and a part-time basis. Obviously, it is most desirable to have all members of the SEPG dedicated 100%, but this is not always achievable in practice. Part-time members can be used for periods of time when the SEPG has a lot of activity occurring for a finite period of time. It is strongly recommended that the organization have at least one person dedicated full time to the SEPG and that he or she be the SEPG leader.

Characteristics of a typical member of the SEPG include

- experience as a practitioner
- expert knowledge in one or more domains
- good interpersonal skills
- respect of their peers in the organization

It will be a difficult task to draw these people, who are some of the best and the brightest that the organization has, away from a project manager who has responsibility for a critical project.

Some staff will want to become members of the SEPG. The ease with which staff can be recruited will depend on the perceived level of management support for the SPI program. Projects may lose some of their best people to the SEPG. This must be allowed to happen. The organization should not sacrifice long-term gain for the organization as a whole in favor of short-term gain for an individual project.

In the long run, the organization must do all it can to ensure the success of the SPI program; yet this has to be balanced against the needs of the individual projects. The SEPG candidates must support the SPI program, be willing to act as champions for the SPI program, and be willing to serve as **agents** of change to the rest of the organization.

The leader of the SEPG must be a respected member of the organization with proven ability. The SEPG leader should also have the confidence of his or her peers and be looked on as someone who can get things done. The SEPG leader also must have the support and confidence of senior management.

In some instances, organizations have written formal job descriptions describing the duties and responsibilities of an SEPG member. They then have posted the open positions for all to see and review, screened applications, and conducted a rigorous interview process in selection of the personnel to staff the SEPG. By doing the staffing in this manner, management sends a clear message to the organization about their view of the importance of the SPI program.

The SEPG will report on their activities to the second component of the infrastructure, the MSG. Additional names for the MSG include *quality management board*, *process improvement steering committee*, and *management steering team*, etc. The MSG is responsible for linking the SPI program to the organization's vision and mission.

Some of the duties of the MSG include

- demonstrating sponsorship for the SPI program
- allocating resources for the improvement activities
- monitoring the progress of the SPI program
- providing guidance and correction to the improvement activities as necessary

Membership of the MSG is usually includes senior manager as leader and selected members of his or her management team making up the rest of the group. This team makes up a standing committee, meeting regularly to address matters relative to the SPI program. The MSG usually meets monthly, but in the early stages of a SPI program it may meet more frequently to insure a proper start.

The third main component of the SPI infrastructure is the TWGs. Additional names for these groups include *process action teams* and *process improvement teams*., etc.

These working groups are created to address a particular focus of the SPI program. For example, there could be a configuration management TWG or a project planning TWG addressing a specific software engineering domain. Also the TWGs do not necessarily have to address technical domains for improvement—they could address such things as travel reimbursement, software standardization, or purchasing, for example.

The TWG is typically made up of those practitioners in the organization who have knowledge and experience of the area under evaluation. Membership will also include those who would be affected by any improvement changes that would be implemented as a result of the investigation.

The TWGs typically have a finite life, the duration of which is usually defined in the charter. After the completion of the TWG objective, it is disbanded, and the members return to their normal duties.

During the early phases of the SPI program, issues of scope usually cause TWGs to underestimate the time required to complete their objectives. This results in TWGs going back to the MSG requesting more time or a reduced scope. Knowledge gained from TWG experience will reduce these occurrences as the scope of the working groups comes to be more specifically defined.

The TWGs report to the MSG. At the monthly meeting that the MSG holds, the agenda will always include a status briefing from each of the active TWGs. The TWGs also have a dotted line reporting relationship to the SEPG. This allows the SEPG to fulfill its charter of being the focal point for process improvement for the organization by keeping abreast of the improvement activities that are under way in the organization. This also allows the SEPG to create a repository of artifacts that have been produced and/or used during the improvement process. This repository, also called the process database, contains records of the data gathered and generated during the improvement process. This process database provides a ready reference for measuring results of the SPI program. It also provides a mechanism for familiarizing new personnel with the operation as they join the SPI program. Physically the process database will probably be a combination of artifacts in file drawers, multiple forms of data held in some machine readable form that belongs to the SEPG, and/or such things as electronic mail messages.

Objectives

- Establish infrastructure to guide and manage the SPI program.
- Create organizational awareness of the SPI program.

Entry Criteria

Commitment to establish and implement a SPI program.

Additional Components

In some instances, benefit can be gained from having additional components to the SPI infrastructure. Typically, these additional components are formed in organizational environments that are either very large and/or have wide geographical disbursement.

The first of these additional components is an executive council (EC). Members of the EC are made up of the senior management from each division. The EC provides broad guidance and interpretation of the organization's vision and mission and communicates this interpretation to the divisions.

At the division level, it is the responsibility of the MSG for the division to ensure that the improvement activities in each division are responsive to the organization's vision and mission as provided by the EC.

The second additional component is usually called something similar to **software process improvement advisory committee (SPIAC)**. This committee is usually created when an organization has multiple SEPGs resulting in multiple improvement efforts occurring across different locations within the organization. Multiple SEPGs are typically appropriate when an organization is large and / or geographically dispersed.

The SPIAC serves as a forum where each of the multiple SEPGs are represented. Through this forum, sharing of experiences, lessons learned, and improvements accomplished will benefit the overall program. A forum in which SEPGs can exchange information reduces the number of false starts, so that SEPGs do not have to duplicate work that other SEPGs have already done.

Figure 6-2 below illustrates how an improvement infrastructure might look in a very large organization.

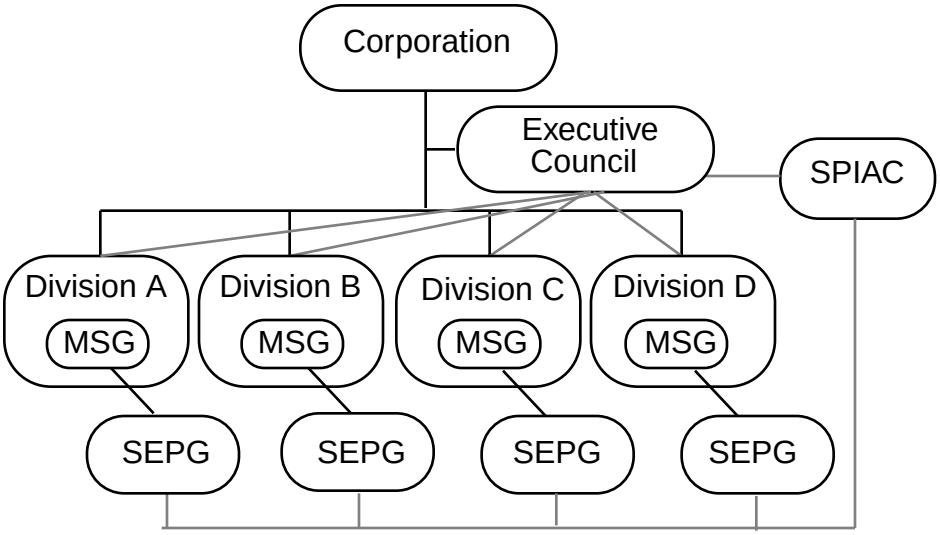

Figure 6-2: Typical SPI Infrastructure in a Large Organization

Tasks

- Establish the MSG.
- Establish the SEPG.
- Develop charter for the SEPG (MSG).
- Demonstrate sponsorship for the improvement activities.
- Develop charter template for the TWGs.

6.3 Planning the SPI Program

Purpose

There will be many plans that will be developed to guide and support the SPI program. Strategic plans are the responsibility of management; tactical plans to address specific improvement activities are the responsibility of the TWGs. There are also installation plans for pilot adoption activity, and plans for rollout and installation of improved processes on a broad scale. Communication plans also need to be developed to insure that communication of the events associated with the SPI program are received properly by the organization. Each of these plans will have schedules that must be monitored and defined milestones that must be reviewed. These schedules and milestones will be used to evaluate progress toward a specific objective allowing management to provide the necessary oversight to the effort.

Developing the SPI strategic action plans for the improvement activities starts with a review of the findings and recommendations that resulted from the baselining activities. This input provides the starting point for development of the SPI strategic action plan. These findings and recommendations, along with the organization's vision, mission, and business needs will help determine the content, priority, and sequence of activities for the SPI program.

One of the continuing activities of an improvement program is build and maintain sponsorship and support for the initiative. To help accomplish this objective, it would be beneficial to the program to find and fix a few quick-fix, quick-return improvement projects—picking the so-called "low-hanging fruit." Implementing these quick-fix improvements and communicating their occurrence will have many benefits. It will help demonstrate to personnel within the organization the value of the initiative by showing

some immediate benefit. It will also help create enthusiasm and support for the initiative.

The SEPG works at both the tactical level and the strategic level within the SPI program, but it will probably concentrate most of its efforts at the tactical level, addressing issues that arise as the SPI program proceeds.

There will be many plans developed, modified, discarded, and completed as the SPI program proceeds, as business conditions change, and as personnel and organizational changes occur. The SPI action plan, developed as a result of the baselining activities, will be the overall guide to the SPI program. Subordinate plans will include

- plans to guide the organization to the point where the SPI action plan is developed (Establishing phase)
- plans for how the infrastructure will work
- plans and charters for the TWGs that will investigate and provide solutions within a specific problem area
- plans for pilot introduction of new or changed technologies
- plans for wide-scale introduction and initiation of piloted changes
- plans on how to adopt and institutionalize proven improvement accomplishments

Appendix B.0 on page 185 has an assortment of sample plans, templates, and charters along with some discussion of their use and application.

Objectives

- Define goals of the SPI program.
- Provide focus and direction for the SPI activities.
- Determine resources required for the SPI program.
- Show commitment for the SPI program.

Entry Criteria

- MSG established.
- SEPG established.
- Organizational **strategic business plan** exists.

Tasks

- Review existing baselines and determine if new baselines need to be developed.
- Plan for and schedule training required for the selected baselines and strategic planning activities.
- Develop organizational plan for the SPI program.
- Based on results from the baselining activities, develop SPI action plan.
- Based on prioritized results from the baselining activities, develop tactical plans.
- Develop detailed schedules through completion of baselining and strategic planning.
- Review and approve plans developed (MSG).

6.4 Staffing the SPI Program

Purpose

In most organizations, existing personnel will staff the SPI program. These resources will include those that are allocated to the improvement work itself and those that are assigned to the SPI infrastructure to guide and manage the SPI program.

In addition to the resources devoted to the management structure, additional resources allocated to the SPI program take two forms.

The first are personnel resources that are allocated full time and make up the SEPG. Staff to fill the positions in the SEPG will usually come from within the organization's development ranks. The success of the SEPG and the effectiveness of the SPI program depend largely on the quality of the people that are recruited for the SEPG.

The SEPG is a small organization; typically, it has a staff size that is equal to 1% to 3% of the organization's practitioners. Occasionally, extra resources will be needed for some specific tasks. To provide these additional resources for the SEPG when required, there may be some temporary members assigned to the SEPG. These assignments are usually for a finite period of time, allowing the members enough time to complete their specific task before returning to their previous duties.

A second set of resources will be required to staff the TWGs that will be formed to address specific improvement issues. Resources for the TWGs are usually committed as a percent of a full-time person; for example, "John, we would like you to spend 20% of your time for the next 8 months working on the TWG that is solving our requirements management problem." These resources are committed for a finite length of time, usually defined in the TWG charter, and are assigned very specific responsibilities within the SPI program by the MSG.

A TWG will be formed by the MSG, given its specific charter and goals. When its tasks are completed, the TWG will be disbanded. There are some instances in which a TWG is active continuously, usually addressing broader issues and consuming a smaller percentage of a members' time.

Typically TWG membership will rotate among the organization's development staff. This will allow the organization to provide fresh insight into the problem-solving process and also allow more personnel to become further exposed to and become a part of the SPI program.

The last component of the SPI infrastructure that will need resources assigned to it is the MSG.

For the most part, resources assigned to the MSG come from the organization's existing management structure, although it is not unheard of to have input from the customer community.

In most cases each major component of the organization is represented on the MSG by at least one member, and leadership of the MSG is provided by the senior executive. Additionally, the SEPG is typically represented on the MSG by the SEPG leader, usually in a non-voting capacity.

Objectives

- Assign management-level staff to the MSG.
- Recruit qualified staff for SEPG membership.
- Recruit and/or assign proper representation to TWGs.

Entry Criteria

- MSG established.
- SEPG established.

Tasks

- Assign management staff to the MSG.
- Create job descriptions for the SEPG members.
- Recruit staff for the SEPG.
- Develop guidelines for TWG membership.

- Recruit and/or assign staff to the TWGs.
- Review resource requirements for each baselining activity against resources available.

6.5 Monitoring the SPI Program

Purpose

As the SPI program proceeds, one of the responsibilities of the MSG will be to periodically review progress of the initiative against the milestones and goals that are defined and documented in the SPI strategic action plan. These progress reviews of the SPI program will be regularly scheduled, and occur at the monthly meeting of the MSG.

The format that the reviews will take should be defined in advance by the MSG, documented in the TWG charter and should have the same format from review to review. It may take a few cycles of review meetings to determine the most productive format for the review and any associated artifacts that are used or distributed at the review.

Evaluation activities encompass all facets of an organization's SPI program. Evaluators ask such questions as

- Are we doing it right?
- Are we doing the right thing?
- Have we achieved the expected benefits?
- Are the improvement projects on schedule?

To monitor the SPI program, a measurement system to evaluate progress must be in place. The key to evaluating the SPI program will be the metrics that are selected for measurement and the ease with which they can be gathered. Measurement will occur at many levels throughout the organization—from very low-level measurements such as coding errors that are found during inspections or testing to higher level measures such as the rate and/or volume of field trouble calls. All these measures should be maintained so that a history of the benefits of the SPI program will be available when needed.

There are generally two forms of evaluation of the SPI program.

1. Micro-level evaluation, whose parameters are defined during the baselining and planning activities. This micro-level evaluation deals with such things as project schedules, milestones, process performance, process quality, and other quantitative measures.
2. Macro-level evaluation, which deals with a set of broader, more qualitative issues such as business issues, business value, competitive factors, market conditions, etc.

Objectives

Ensure that

- improvement activity is consistent with corporate objectives
- plans for the SPI program are being followed
- progress toward improvement goals is being made

Entry Criteria

- TWGs are defined and operational.
- Working group plans have been developed and approved.

Micro-Evaluation

The infrastructure evaluates the SPI program at the micro level by measuring progress of the SPI program quantitatively. This evaluation includes the existing process and technologies and also the setting of expectations from new or different processes and technologies not yet in use by the organization but being considered for adoption.

Process performance also should be evaluated. The effectiveness of old and/or existing processes should have some type of metric that can easily be applied to determine whether or not these processes are contributing to the overall mission of the organization. Processes should also be measured to enable comparison of current performance to new performance when new or improved processes are implemented. Once new processes are implemented, they should be continuously monitored and their performance evaluated to ensure that the benefits expected from their introduction are being achieved.

Quality performance of the processes is also evaluated at the micro level. During the baselining process and during the development of plans for new or revised processes, quality expectations and quality metrics are defined and implemented within the processes to verify their benefits. Later, as the improvements are implemented, a longer range comparison of expected or planned results can be made.

The monitoring, evaluating, and reporting on process quality and effectiveness is typically the responsibility of the software quality assurance group. The SEPG will play a supporting role in this effort. The SEPG will not be the only group assisting in this effort. Project staff will also provide input regarding quality and effectiveness of processes used in the development activity.

Working groups will provide input about expectations for new processes being introduced and the quality and effectiveness of existing processes that they are investigating.

At the micro level of evaluation, members of the SEPG, quality assurance personnel, the TWGs, and the project staff are responsible for evaluating the performance of the process and recommending and applying control mechanisms to achieve the expected results.

Macro-Evaluation

Evaluations of the SPI program at the macro level tend to be more qualitative and are therefore the responsibility of the MSG.

When designing the new processes, consideration must be given to the data that management needs to make these more qualitative evaluations at the macro level. Management will also consider data that is input from other sources such as market information, competitive information, vision and mission interpretations, and input from the general business environment.

Monitoring the SPI program and applying proper control procedures will ensure that the goals and objectives of the program are being met. It will also ensure that the program

is consistent with corporate strategies. Each component of the infrastructure must periodically review its own progress and also review the progress of its subordinate organizations.

Individual improvement efforts are evaluated in the review meetings that have been defined and documented in the schedules.

Periodically reviewing the progress of the improvement program enables detection of early warning signals that can indicate that the SPI program is off track. Two key questions should be asked at each of the program reviews:

1. Are we meeting the milestones set for this individual program?
2. Are the programs consistent with the strategic direction of the corporation?

The format that the reviews will take should be defined in advance by the MSG and should be the same from review to review.

The plans that are developed to guide the improvement activities will include identification of milestones, scheduled review meetings, and defined deliverables. The regularly scheduled in-process reviews will compare progress against the previously agreed-upon schedules. In this manner, the MSG will be able to get early warning of any difficulty occurring within the SPI program and be able to provide corrective action.

After evaluating available alternatives and selecting a solution to provide for improvement, an approach for introducing the selected solution must be formalized. This includes obtaining sponsorship, planning the implementation, evaluating risk, and selling the new technology to pilot users. After selecting the pilot and testing the technology and approach to implementation with the pilot, the results are evaluated. This evaluation answers these questions:

- Did the new technology improve the process it was selected to improve?
- Are there any downstream effects that were not planned for?
- What lessons were learned in the pilot that can be applied so that implementation has minimal impact?

From the lessons learned with the pilot, the implementation approach is revised for wide-scale adoption. The revised plan from the pilot is used to introduce the technology on a broader scale across the organization.

During the time that the implementation has been occurring across the organization, a support mechanism for the new technology must be established. Also at this time, lessons learned during the adoption and institutionalization process should be documented and analyzed. These are retained in the process database for use in future adoption and institutionalization activities.

From time to time, course correction or change of focus of the SPI program may be necessary, for such reasons as business opportunity, organizational or personnel changes, funding issues, and others. This is not unusual and should not be cause for dismay. By having scheduled, periodic reviews of the activities of the SPI program, the MSG will be able to provide the necessary guidance and be able to make informed decisions regarding the overall effort at the earliest opportunity.

Tasks

- Define procedures for SPI status/progress reviews.
- Develop schedule for SPI status/progress reporting meetings.
- Review progress against SPI strategic action plan.
- Review process performance against plan.
- Review strategic direction.

6.6 Directing the SPI Program

Purpose

The SPI program needs direction on two levels—strategic and tactical. The strategic-level direction insures that the overall goals of the organization will be met. The tactical-level direction insures that specific improvement activity, consistent with the strategic goals, is accomplished. The MSG is charged with providing this direction to the effort.

At the strategic level, the MSG will ensure that the SPI efforts are linked to the organization's overall vision and mission. Working at this strategic level, the MSG is concerned with a broad set of issues that can affect the SPI program. Some additional areas for review and evaluation include market opportunities, organizational structure, technology advances, available resources, etc.

Some of the responsibilities include

- reviewing and linking together the existing policies of the organization
- evaluating how these existing policies help or hinder the SPI program and how they integrate with the overall vision and mission

The MSG will tie all this together. Integrating all of this with the findings and recommendations from the baselining efforts is a critical step in determining the priorities of the SPI program.

Direction at the tactical level is focused on getting the proven improvement activities completed and institutionalized. The MSG must resolve any and all impediments discovered during the evaluation of existing organization policy and procedures.

TWGs must be chartered to address specific improvement areas that have been previously agreed upon and prioritized by the MSG. The charters that will be developed must be drafted so that the schedule, milestones, and resources

are understood by all members of the TWG. Additionally the progress reporting requirements should be defined and scheduled for the duration of the TWG.

Directing the activities of the SPI program will not be as easy as it appears. Consideration must be given to the way in which changes in one area, no matter how minor, can have a ripple effect on the entire organization.

Such events can be prevented by making sure that the proper people are represented on the TWGs and that changes are piloted in a controlled setting before being released across the organization. The working group should include users of the process, suppliers to the process, and receivers of the finished product. By itself this will not ensure that the problem will be solved, but it will significantly reduce its chance of occurring.

Objectives

Ensure that SPI program direction is consistent with the organization's vision and mission.

Entry Criteria

- Organization's vision and mission are defined and documented.
- Organization policy that provides guidance to the software development activities exists.
- Strategic plan is available that prioritizes the improvement activities.

Tasks

- Review existing policies and procedures.
- Evaluate existing policies and procedures to determine priorities for establishing TWGs.
- Authorize and initiate TWGs as required.
- Evaluate criteria and make informed decisions regarding priority and direction of SPI program.

A.0 Components of the Software Process Improvement Infrastructure

Objectives

This appendix provides a brief discussion the three principal components of the software process improvement (SPI) infrastructure. The reader should become familiar with the roles and responsibilities that are outlined for each component.

The identified roles and responsibilities are only a starting point; they can be expanded or contracted to fit specific organizations.

In some instances benefit can be gained from having additional components to the SPI infrastructure. These components are described in A.4 on page 179 and A.5 on page 182. Typically, these additional components are formed in organizational environments that are either very large and/or are geographically dispersed.

Purpose

Executive management will determine the size, scope, and responsibilities of the infrastructure to support the SPI program. Taking into account such things as the organization's size, needs, strategy, and culture, management will determine the number of layers, authority, and responsibility for each component and who should be represented within the infrastructure.

To build buy-in for the SPI program, the infrastructure is created and staffed with representatives from all parts of the organization. Involving all parts of the organization builds a feeling of ownership and participation in the program.

An example of an infrastructure is shown in Figure A-1 on page 168. The first of the three components shown is a management steering group (MSG), whose membership is drawn from the organization's existing management structure. Reporting to the MSG is the software engineering process group (SEPG). The leader of the SEPG also participates as a non-voting member and sometimes serves as the facilitator for the MSG. Membership of the SEPG is drawn from the practitioners who are working on the projects in the organization. Depending on the size of the organization, SEPG membership can be on a full-time, part-time, or some combination of full- and part-time basis. In all cases there should be a full-time person leading the SEPG.

Reporting to the MSG with dotted-line relationship to the SEPG are the technical working groups (TWGs). Membership on the TWGs is drawn from those areas of the organization that would be affected by any recommendations for improvement change made by the TWG.

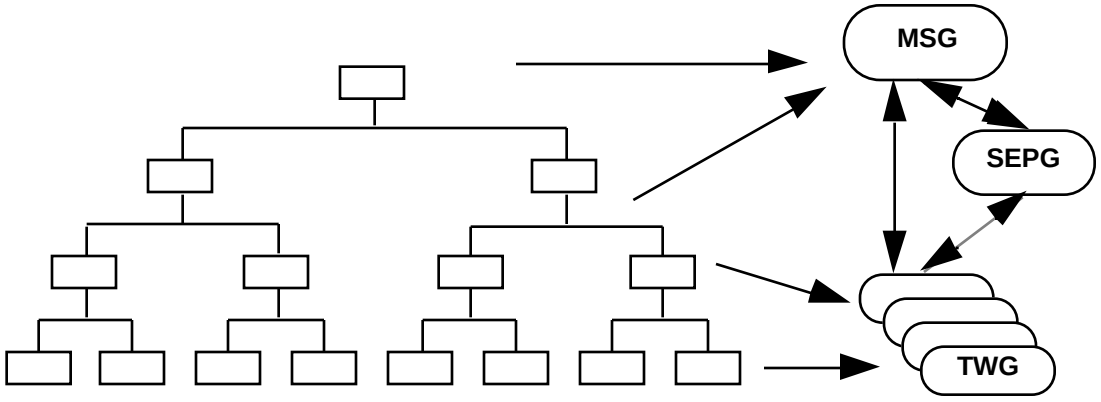

Figure A-1: Example of Infrastructure

The components that make up the SPI infrastructure each have a specific role in the SPI program. The infrastructure that is created should be sized based on the needs of the SPI program. Care should be taken that the size and shape of the infrastructure does not get in the way of the SPI program. Each component has a scope of clearly defined duties

and responsibilities. Figure A-2 below is an expansion of the infrastructure to support a SPI program.

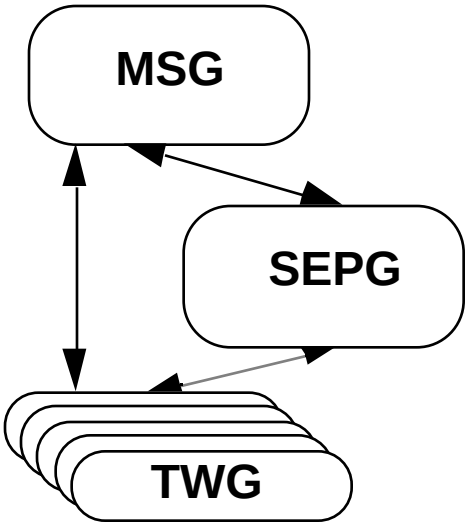

Figure A-2: Expansion of Infrastructure in Figure A-1

A.1 The Management Steering Group (MSG)

Purpose

The MSG is made up of the management team that represents the highest level of management in the organization. Its purpose is to guide the SPI implementation activities in the organization. The MSG will establish the goals and objectives and set the direction and priorities for the SPI program. The MSG should also apply improvement activities to the existing management processes.

The MSG will supply the resources necessary to carry out the SPI program. It will

- charter TWGs for specific process improvement
- approve training to support the SPI program
- determine the measurement and success criteria used to evaluate the program

The MSG will also serve to resolve issues that arise during the SPI program that cannot be handled by the SEPG and TWGs. The MSG removes barriers to the SPI program and creates a recognition and reward structure to recognize the efforts of the people involved in accomplishing the process improvement.

The MSG is made up of the senior site manager, as chair, and other members drawn from his or her management team. The MSG meets monthly, probably more frequently in the early stages of the SPI program, moving toward a fixed monthly schedule. It would be a good practice to have the SEPG leader be the facilitator for the MSG meetings. The meeting is mandatory for all MSG members and operates formally with agendas, minutes and action items. By its actions the MSG can demonstrate to the organization its commitment and support of the SPI program.

The MSG will exist for the duration of the SPI program. Members may change as the organization changes and ma-

tures, but the roles and responsibilities to the SPI program will remain.

Objectives

- Link SPI program to organization's vision and mission.
- Allocate resources and insure work distribution.
- Monitor implementation results and provide corrective actions as necessary.

Tasks

Activities that will be performed by the MSG include the following:

- Approve SPI strategic action plans.
- Establish TWGs.
- Draft TWG charters.
- Draft tactical action plan.
- Hold monthly meetings (2-4 hours).
- Review results of baselining activities.
- Allocate resources.
- Monitor working group progress.
- Approve broad installation of improvements, dependent on results of pilot activities.
- Report progress to executive council (EC).
- Facilitate EC meetings.

A.2 The Software Engineering Process Group (SEPG)

Purpose

The SEPG is the focal point for the organization's SPI program. It is responsible for and facilitates the activities that relate to software process improvement, such as action planning, process improvement, technology improvement, and other activities. The SEPG also exchanges information between the organization's SPI program and the programs of other SEPGs across the country. The SEPG coordinates and plans all of the organization's SPI programs. The SEPG also leads the organization's improvement efforts.

The SEPG maintains an organizational awareness of the overall SPI effort and serves as a facilitator to insure the successful completion of improvement activities. As the catalyst for the SPI program, one of the biggest challenges for the SEPG is to maintain the motivation and enthusiasm for process improvement across and between all levels of the organization.

Facilitate SPI Throughout the Organization

Facilitating SPI throughout the organization means that the SEPG has to obtain and maintain management support for the initiative at all levels and across all functionality. The SEPG is assisted in accomplishing this by working with the MSG to demonstrate commitment to practitioners and management of the organization.

The SEPG will facilitate software process assessments and, along with the organization's management and practitioners, will develop the SPI strategic action plan to guide the efforts. The SEPG will also facilitate other baselining activ-

ities to provide definition for existing process definitions and measurement activities.

Provide Process Consultation

The SEPG supports the line managers and development projects by providing process consultation when required. It also works closely with the line managers and projects to provide guidance and support when new improvement changes are being introduced. It can assist the line organizations in evaluation of new technology and can also help plan for the introduction and transition to new technologies.

Track and Report SPI Progress

Another activity of the SEPG is to monitor all of the SPI activities in the organization. The SEPG will report the status of the various improvement activities that are in progress to the MSG. The SEPG should establish and maintain a process database for retaining the various artifacts that result from the improvement activities. Timely reporting of SPI status will allow the MSG to make informed decisions that will support and enhance the success of the SPI program.

Serve as Focal Point for Organizational Learning

The SEPG will also serve as the focal point of the organization's SPI activities. It will arrange for or conduct training in process improvement and continuing education in other subjects relevant to the SPI program. From the process database, the SEPG will be able to maintain and disseminate lessons learned as a result of the SPI program.

Size

The SEPG should be staffed at a full-time level that is equivalent to 1 - 3% of the organization's development staff. In some smaller organizations (fewer than 100 professionals) at least one person, the SEPG leader, should be devoted full time to SEPG responsibilities. From time to time, the SEPG will need additional resources to function effectively.

These resources can be "borrowed" from the line organizations on a part-time basis. Assignments to the SEPG are

usually made for a fixed period of time, on the order of one to two years, after which the practitioners return to their line organizations and their place on the SEPG is filled by another practitioner.

Membership

Characteristics of members of the SEPG include experience as a software development practitioner, sound knowledge in one or more domains, and respect of their peers in the line organizations.

The members must support the SPI program, championing it to the rest of the organization. They must also have the capability to effectively serve as agents of change as new and improved processes and technologies are introduced to the organization.

SEPG members are critical to the success of the SPI program. It would be a good practice for the MSG to set up a screening and/or interview process for SEPG membership. This would help ensure that members have the proper background, experience, and enthusiasm for the job.

In most organizations members of the SEPG are on temporary assignment ranging from one to two years. Although they may return to their regular jobs, the SEPG continues.

Objectives

- Facilitate SPI throughout the organization.
- Track and report status of SPI programs.
- Serve as focal point for organizational learning.

Tasks

Some of the tasks that are performed by the SEPG include the following:

- Hold weekly meetings.
- Identify and recommend improvement activities to MSG.
- Track and report progress of improvements to MSG.
- Determine effectiveness of improvements.
- Develop and maintain process database.

- Develop training plans and arrange for training.
- Provide consultation to projects.
- Facilitate CBA IPIs.
- Facilitate MSG meetings.

A.3 The Technical Working Group (TWG)

Purpose

TWGs are the solution developers for the SPI program. They are formed to address a specific area in the overall improvement process. Their responsibility is to address a specific area for process improvement, and they are given a charter, resources, and authority to complete their activity.

The purpose of a TWG is to improve the process that it has been chartered to evaluate and improve. The TWG is formed by the MSG to address a specific process area. To properly carry out its job, the TWG must be given proper guidance by the MSG. This is documented in its charter, which defines a clear mission, states the objectives, and delegates authority to accomplish the mission. Also implied is a commitment of necessary resources and the support of management to get the job done.

The TWGs can address processes at any level in the organization. They can be made up of managers, addressing high-level, cross-functional processes, or they can be made up of practitioners, addressing lower level, single-function processes. Key to the membership of the TWG are that the members are drawn from staff who

- are knowledgeable about the process being evaluated
- work in the process
- would be affected by changes made for the improvement of the process

The leader of the TWG should be the owner of the process that is being evaluated. For example, a TWG formed to evaluate and improve the testing process would have the manager of testing as the TWG leader. Other members of the TWG would be selected to provide alternative perspectives to the process being studied. Having TWG members who are either customers of the process or suppliers to the process is also beneficial. If possible, the members of the

TWG should be volunteers as opposed to being assigned to the team. This will ensure that the team members have an expressed interest in the activity. Participation on a TWG also provides for broadening of support and additional buy-in to the improvement activities.

The frequency of TWG meetings varies. Some teams meet weekly for an hour at a fixed time and day. Other teams may meet every other Tuesday for four hours. Regardless of the frequency, the meeting is mandatory for all team members, is very focused, and is fast moving. The team follows a formal agenda, and at the end of the meeting time is reserved to evaluate the meeting. It will take a few meetings for the team to get to know and be comfortable with each other before they start functioning effectively. If possible, it would be a good idea for the first one or two meetings to be devoted to instruction on team concepts and meeting effectiveness.)

Objectives

- Document current processes.
- Assess current processes.
- Improve current processes.
- Develop plan to pilot improved process.
- Pilot the new improved process.

Tasks

Activities that are performed by a TWG include the following:

- Research problem and identify solutions.
- Formulate solution.
- Revise tactical action plan to fit selected solution.
- Present possible solutions to MSG along with proposed solution.
- Select initial prototype group.
- Begin prototyping.

- Evaluate results of prototype.
- Revise tactical action plan with lessons learned from prototype.

A.4 The Software Process Improvement Advisory Committee (SPIAC)

Purpose

The purpose of the SPIAC is to support the long-range process improvement activities of the organization by facilitating interaction among the organization's SEPGs, promoting information-sharing and providing a mechanism for the SEPGs to address common problems.

The SPIAC can be a very valuable resource for those organizations that have multiple SEPGs. These SEPGs may be operating in the same or different geographical locations. The SPIAC will provide the organization a vehicle for sharing information about the organization's SPI programs. Each member site of the SPIAC will contribute lessons learned and reports of successful improvement activities, which will benefit other SEPGs in the organization. Much valuable information can be exchanged: techniques used for improvement activities, technology evaluations, vendor experiences, etc.

The purpose of an SPIAC is to foster communication. Each of the participating sites has learned some valuable lessons as it has progressed. Having a forum where these lessons can be shared along with successful improvement activities will benefit the entire organization. Member sites will be able to capitalize on work that has already been done at other sites.

SPIACs should meet quarterly. At the beginning of the SPI program, it would be advantageous to meet more frequently to resolve all of the start-up issues such as charter, officers, length of term, etc. Meeting duration is at least one full day as there will be plenty of work to accomplish. Occasionally the meeting may last for two days.

Overall membership includes all members of all of the organization's SEPGs, with one voting member for each SEPG represented.

Meetings can be held at different SEPG sites on a rotating basis. Thus the host site and others in close proximity may have more than one representative attend the meetings. Remote sites would be represented by as many SEPG members that the site could afford to send, but at least one member, preferably the SEPG leader should attend each meeting.

The chair of the SPIAC is elected for a term of one to two years. The chair is responsible for the agenda and for coordinating the meeting activities, schedule, location, and so forth. The site hosting the meeting is usually responsible for the local arrangements, meeting minutes, and other activities necessary to facilitate the meeting.

Objectives

The main objective of a SPIAC is to provide an organizational forum for sharing information regarding the SPI activities that are being undertaken by different parts of the organization. Additionally, the SPIAC can

- advise management on SPI matters
- establish common positions on critical SPI issues
- identify the benefits of SPI implementations
- identify the requirements for SPI implementations
- maintain the process database for items that are suitable for implementation across all locations
- maximize the sharing of SPI resources across the organization
- participate with external organizations and software process improvement networks (SPINs) for SPI programs

Tasks

Activities of the SPIAC include the following:

- Hold regularly scheduled meetings (quarterly).
- Share lessons learned with other SEPGs.
- Share solutions developed with other SEPGs.
- Establish common position on critical SPI issues.

- Advise management on global SPI matters.
- Identify benefits of SPI implementations.
- Maximize the use of SPI resources across the organization.

A.5 The Executive Council (EC)

Purpose

The EC is concerned with how the overall improvement efforts tie in with the vision and mission that the organization has set for itself. Typically, the EC reviews the SPI and other process improvement efforts with knowledge of the corporation's future directions and guides the SPI program to support that vision.

The EC wants to ensure that the overall improvement efforts, including SPI, are proceeding in a direction to support the corporate vision. To support its direction for the organization, the council may elect to communicate certain broad improvement strategies down the infrastructure chain of command to guide the improvement efforts. This broad guidance, based on strategic opportunities, becomes more focused moving down the SPI infrastructure. The divisions or individual business units can enhance and add focus to the guidance from the EC based on the product produced and market opportunities in their business environments.

Membership on the EC is kept very small. There are no more than three to five members who are the organization's most senior management.

Meetings should be held semi-annually. At the meetings, members of the EC review and discuss the progress of the SPI programs. Changes in direction or focus should be communicated to the infrastructure.

Objectives

- Provide management oversight to a large geographically dispersed SPI initiative.
- Monitor SPI initiative.
- Evaluate SPI initiative.
- Provide corrective actions as necessary to the SPI initiative.

Tasks

Some of the activities performed by an executive council include the following:

- Hold meetings as necessary (semi-annually).
- Evaluate progress of SPI activities against defined criteria.
- Review SPI activities against business needs.
- Institute corrective actions as necessary.

B.0 Charters and Templates

Purpose

A charter is an important document in a software process improvement (SPI) program. A charter serves as an agreement or contract between two parties. On one hand, the charter makes explicit the authority and responsibility of the entity being chartered and defines the scope and mission. On the other hand the charter conveys commitment from and implied support by the chartering entity.

The first part of this appendix contains examples of actual charters that are in use by organizations that are pursuing software process improvement.

The second part of the appendix contains templates that can be used in the planning activities. There are templates for a strategic action plan used by the organization in planning its SPI activities (page 194), a template for a tactical action plan used by TWGs (page 198), and a template for an installation plan used to install an improvement (page 200).

It should be remembered that these are only samples and suggestions. What works in some organizations may not work in others. Readers should tailor these instruments to fit their organizations.

B.1 Management Steering Group Charter

Generalized Research Company - Electronics Group

Research, Development, and Engineering Center

Software Engineering Division

Cooperstown, New York

Management Steering Group (MSG) Charter

14 November 1991

1. **PURPOSE:** The purpose of this Charter is to:

- Establish the GRC-EG Software Engineering Division (SED) MSG for Software Process Improvement.
- Define the mission, responsibilities, membership, and conduct of operations for the MSG.

2. **SCOPE:** This Charter applies to all organizations and personnel, including sub-contract personnel, located at the Electronics Group, Cooperstown, New York.

3. **AUTHORITY:** Director, Software Engineering

4. **MISSION:** To support the operation of the Software Engineering Process Group and the execution of the approved Action Plan for software process improvement within SED. Utilizing the Software Engineering Institute (SEI) capability maturity model (CMM) -based appraisal for internal process improvement (CBA IPI) Software Process Assessment (SPA) methodology, SED's goals and objectives are to identify key areas for process improvement and to propose a framework for improvement actions consistent with the SED vision for software process improvement. It will also include oversight support of Total Quality Management (TQM) initiatives.

5. **MANAGEMENT STEERING GROUP RESPONSIBILITIES:**

- To approve the establishment of Technical Working Groups (TWGs).
- To approve and support the membership of TWGs.

- To provide guidance to TWGs work in progress.
- To support the implementation of approved recommendations.
- To approve TWG initiatives and recommendations.
- To terminate TWGs, as appropriate.

6. **MEMBERSHIP:**

Director, GRC-SED (Chair)	Assistant Director, GRC-SED
Director, Systems Support	Director, Operation and Engineering
Manager, Applications Development	Manager, Network Development
Manager, Customer Support Center	Manager, Quality Assurance
Manager, Systems Software Development	Manager, Documentation Development

7. **ASSOCIATE MEMBERSHIP:** Manager, SEPG

8. **CONDUCT OF OPERATIONS:**

- The Management Steering Group will meet bi-monthly or as called for by the Management Steering Group Chairman.
- Meetings will have a formal agenda distributed at least three days prior to the meeting and all meetings will be documented.

9. **TERMINATION:** Not applicable.

_____

Daniel A. Gibson

Director, Software Engineering Division

B.2 Software Engineering Process Group Charter

General Research Company - Electronics Group
Research, Development, and Engineering Center
Software Engineering Division
Cooperstown, New York

Software Engineering Process Group (SEPG) Charter

12 December 1991

1. **PURPOSE:** The purpose of this Charter is to authorize and approve:
    a. The establishment of a Software Engineering Process Group
    b. Membership
    c. Conduct of operations
2. **SCOPE:** This Charter applies to all organizations and personnel located at the Electronics Group, Software Engineering Division, Cooperstown, New York.
3. **AUTHORITY:** Director, Software Engineering
4. **MISSION:**
    a. To manage the Electronics Groups process improvement program.
    b. To organize and initiate the prioritized actions in the approved Electronics Groups Action Plan.
    c. To facilitate and monitor the development and implementation of process improvements.
    d. To create an atmosphere to foster change.
5. **RESPONSIBILITIES:**
    a. Oversee process improvement activities and report progress.
    b. Serve as Electronics Group's Change Agent.
    c. Lead Electronics Group Software Process Assessments (SPAs).
    d. Facilitate action planning.

e. Oversee Electronics Group's TQM Program.

f. Facilitate and advise Technical Working Groups (TWGs).

g. Provide for training necessary to promote TQM and process improvement to maintain an atmosphere receptive to change.

h. Serve as focal point for coordination of Electronics Group process improvement activities with SEI, Corporate headquarters, and sub-contractor organizations.

i. Oversee activities of all Electronics Group SEPGs.

6. **MEMBERSHIP:** The Software Engineering Process Group membership consists of Core Members, and Review Members. Membership will be re-established during the planning phase for the next Electronics Group SPA effort. The identification and responsibilities of Software Engineering Process Group members are defined below:

a. Core Members will participate 100 percent of their time excluding leave and required administrative duties. The Core Members shall perform the majority of overseeing implementation of the Action Plan toward process improvement. The Core Members are:

David Rimson, SEPG Manager

John Sibling, SEPG Member

Renee Doyle, SEPG Member

Barbara Cott, SEPG Member

Janet Dempsey, SEPG Administrative

b. Review Members will contribute up to 10 percent of their time. The Review Members are a representative group of managers and practitioners who meet as required to provide insight, additional data, and consensus on the implementation of the Action Plan. Review Members will also act as a focal point to identify experts within their organization on particular topics. The Review Members are:

Systems Support, C. Royce

Applications Development, T. Royce/J. Hasek

Customer Support, R. Davidson

Systems Software, P. Thomas

Operations & Engineering, R. Fichter, D. Jockel

Network Development, T. Dzik

Quality Assurance, J. Potoczniak

Publications, M. Burkitt

7. **CONDUCT OF OPERATIONS:**

a. The SEPG will report to and receive guidance from the Assistant Director, Software Engineering Division, Electronics Group.

b. SEPG will hold regular meetings as required.

c. The SEPG will keep the Division Director, Assistant Director, Division management, and Sub-contractor management informed via regular reports through the Assistant Director.

d. The SEPG will facilitate TWG Meetings.

e. The SEPG will present periodic status reviews and conceptual briefings to the Management Steering Group (MSG).

f. The SEPG Chair will be an associate member of the MSG.

8. **EXPECTED PRODUCTS:**

a. Documented processes and procedures on the execution of the Division's software processes

b. Status review briefings to MSG

c. TWG Status Reports

d. Newsletter input to Software Engineering News

e. Monthly update newsletter on electronic mail

f. Presentations to Division workforce on process improvement

g. Process improvement promotional materials

h. Process improvement metrics reports

9. **MILESTONE PLAN:** To be presented and approved by the MSG at the first meeting.

10. **TERMINATION:** The SEPG will function indefinitely.

_____

Daniel A. Gibson

Director, Software Engineering Division

B.3 Software Process Improvement Advisory Committee Charter

Corporate Accounting Services (CAS)

Software Process Improvement (SPI)

Advisory Committee (AC)

Charter

1. **PURPOSE**. The purpose of the CAS SPI Advisory Committee (SPIAC) is to support the long-term process improvement activities of the SEPGs by facilitating interaction among the CAS SEPGs which will promote information sharing and provide a mechanism for the SEPGs to address common problems.

2. **SCOPE**. This Charter applies to the membership of the SPIAC and joint activities of the individual SEPGs established by CAS. The scope of this charter is to:

   a. Delineate the mission of the SPIAC

   b. Define the concept of operations

   c. Define the membership

3. **MISSION**.

   a. Provide a forum for sharing of process improvement issues, information, successful practices, and lessons learned among the CAS SEPGs.

   b. Advise CAS management on process improvement matters.

   c. Establish joint positions on critical software engineering process improvement issues.

   d. Identify benefits of and requirements for process improvement implementation across the SEPGs.

   e. Maintain software engineering process definitions, improvement methodologies, improvement tools, and process improvement metrics that are suitable for implementation across the centers/sites.

f. Maximize the sharing of available Software Engineering Institute (SEI) and other process improvement resources across CAS SEPGs to include coordinating common education on process improvement.

g. Participate with government organizations, industry, academia, and Software Process Improvement Network (SPIN) process improvement efforts.

4. **CONCEPT OF OPERATIONS**.

a. The SPIAC will conduct its activities in an atmosphere of non-attribution.

b. The following roles will be established for the functioning of the SPIAC: facilitator, member, scribe, minute taker, time keeper, host, and technical advisor. The specific responsibilities for these roles will be agreed to by the SPIAC.

c. The SPIAC will meet quarterly, and will be scheduled, if possible, to coincide with the annual SEPG National Meeting and the annual Software Engineering Symposium. SPIAC meetings will coincide with CAS Directors' meeting as necessary.

d. Site and agenda for each meeting will be determined by mutual consent of the SPIAC.

e. SPIAC members will execute tasks as agreed upon during meetings.

f. SPIAC can recommend supplemental PATs/working groups for software process improvement.

g. Reports, recommendations, and minutes will be submitted to the CAS Directors.

h. All SEPG members are welcome to attend all meetings. One SEPG member will be designated to represent each site, with all attendees having equal voice discussions.

5. **MEMBERSHIP**.

a. The recognized CAS SEPG sites are as follows:

CAS West, San Diego

CAS South, Atlanta

CAS East, Philadelphia

CAS International, New York

b. Membership is open to all SEPG members from these sites.

c. The Software Engineering Institute is invited to attend SPIAC meetings in a technical advisory role.

6. **REVISION**. This charter will be reviewed and revised as deemed necessary by the SPIAC and its sponsors.

7. **TERMINATION**. The SPIAC will function continuously until such time as it is no longer needed.

8. **SPONSORS**.

_____

David F. Wilson
Director, CAS West

_____

William Johnson
Director, CAS South

_____

James W. Davison
Director, CAS East

_____

Robert Smithwell
Director, CAS International

B.4 SPI Strategic Action Plan

Purpose

This plan provides an introduction to the SPI program with context and background for how the organization has arrived at this point.

- It is based on baseline Findings and Recommendations Report.
- It describes the motivation and direction for addressing the findings within an SPI program.
- It defines long-range and near-term goals.

Contents

The suggested sections in the SPI strategic action plan are identified in the left column and comments are in the right column.

1. Overview

Provide context and background on how the organization arrived at this point.

2. Executive Summary

Explain how this action plan will integrate all software process improvement activities at this center.

- Explain how the current improvement efforts will be linked to recommendations from the assessment and how those efforts and future efforts will be integrated, coordinated, and tied to the vision.
- Explain also that this strategic action plan will provide answers to the following questions: (*Note*: Examine these questions. If they are not the right ones for your organization, change them. Make sure that there are sections within the plan that address each question, however.)
    - What are our goals for the SPI program?
    - What is our motivation to improve?
    - What assumptions are we making?
    - Who are the players?
    - How will we measure successes?

- How will we continue to improve?

3. Process Improvement Goals

- Define the long-term (3-5 years) and short-term (1 year or product cycle) goals for the improvement program.
- List the strategic goals that have been developed as a result of the assessment (e.g., productivity, quality, risk, maturity goals from the action plan structure materials).
- List the strategic goals that have developed from the vision or other sources. (*Note*: Keep goals few, concise, unambiguous, and measurable.)

4. Objectives

First, describe *why* this SPI program is important and why anyone should care and want to do anything.

- List the principal motivations (e.g., increase competitiveness, avoid consolidation or closure) that will drive the SPI program.
- State the objectives (e.g., to improve the quality and productivity of the organization's products, services, and resources) and the consequences of maintaining status quo.

Second, define the guiding principles to be followed during the SPI program to achieve the goals and objectives (e.g., using the SPI program to model higher maturity behavior. Look at the next maturity level and determine how those key process areas can be applied and used in the SPI program itself.)

5. Assumptions and Risks

- List critical assumptions (e.g., sponsorship, work load, resource availability) and describe how each affects the plan.
- Discuss the risks implied by these assumptions.
- Identify the barriers, including the non-technological barriers, to the improvement program and describe the strategies to reduce those barriers. (*Note*: If using the Managing Technological Change implementation plan, tie it in here.)

6. Organization for Process Improvement

- Define and describe the infrastructure that is in place or being created to support the improvement program.
- Describe the organizational entities (e.g., MSG, SEPG, etc.) created to support process improvement in terms of their composition, roles, responsibilities, and interfaces. Reference the charters for these groups and attach those charters to Section 9, Improvement Agenda.
- Identify the sponsor and what current resources are committed. (*Note*: this is summarized from the resources identified in Section 9.)

7. Responsibility Matrix

- Describe which group is responsible for what throughout the SPI program
- List the SEPG coordinating activities with the MSG and TWGs.
- Describe which group is responsible for what throughout the SPI program.

8. Criteria for Success

- Describe how the goals from Section 3 (Process Improvement Goals) will be measured and how the organization will recognize success in achieving those goals.
- Describe how improvement activities will be measured and evaluated at both the organizational and project levels.

9. Improvement Agenda

This section provides the *what* of the action plan. The efforts are described at a high level, resource requirements are identified, and the relationships between each major activity are described so that the reader can see how these different activities are integrated.

- Provide a high-level description of all current improvement efforts in terms of what they are doing, what resources are currently committed to the activity, and what resources are required to complete the activity.
- Describe how the above existing activities map to the recommendations from the assessment. Identify any gaps, partial or otherwise, between the recommendations and the current improvement activities.

- Provide a high-level description of all additional improvement activities that will be needed to completely address all of the recommendations and achieve the goals and objectives of this action plan. This description should be expressed in terms of what each activity will accomplish and what resources are required to accomplish the activity.
- Define how activities will be prioritized and what the priority and selection criteria will be.
- Identify how improvement projects will be selected to participate in the SPI program.

B.5 Tactical Action Plan

Purpose

This plan identifies the activities, schedules, and deliverables of a TWG.

The plan also discusses resource requirements; interfaces and dependencies with other groups; assumptions, risks, and risk mitigation; and schedules and milestones.

- Specify the charter and scope the effort of the TWG.
- Guide the TWG efforts.

Contents

The suggested sections in the tactical action plan are identified in the left column and comments are in the right column.

1. Introduction/ Overview	• Identify the recommendation that this plan will support. • Provide an overview of what must be accomplished.
2. Objectives/ Charter	• Describe the objectives and purpose of this working group. (*Note*: If this information already exists in the form of a charter, that document should be appended to the action plan.) • Describe the scope of the working group's efforts.
3. Detailed Description	• Provide an accurate and concise description of the task. • Include a definition of what the task is and a list of the major activities and artifacts associated with it.
4. Resources	Describe resources required for this task, including personnel, money, computer resources, etc. Also describe who is responsible for each task.

5. Interfaces/ Dependencies	Each working group has an interface with other groups. Define and document these interfaces in this section.
6. Work Breakdown Structure (WBS)	Break the overall task into small, manageable pieces that can be used as the basis for planning, identifying milestones, reporting, and control.
7. Schedule	• Describe when each of the task elements described in the WBS are to be completed. Use Gantt or PERT charts. • Key accomplishments should be made into milestones and tracked against original estimates.
8. Risks	Provide a basis for risk management and contingency planning.
9. Status/Monitoring	• Describe how status will be reported. (*Note*: Completed status reports should be appended to the tactical action plan to maintain a history of all activity.) • Discuss how progress will be monitored (comparisons of actual progress against proposed schedules). • Discuss how significant schedule deviations or changes will be handled.

B.6 Installation Plan

Purpose

This plan will define the steps necessary to install an improvement into a sub-unit of the organization. The plan will contain the objective and purpose of the improvement, a WBS of the activities, schedules, resource requirements, and criteria for success.

Contents

The suggested sections in the installation plan are identified in the left column and comments are in the right column.

1. Introduction/ Overview	• Identify the technology to be installed that this plan will support. • Provide an overview of what must be accomplished.
2. Goals, Objectives and Purpose	Describe what will (should) be accomplished, why it is needed, and what kinds of projects or functional areas it applies to. (*Note*: goals should be measurable.)
3. Technology Description	• Provide an accurate and concise description of the technology. • Include a definition of what the technology is and a list of the major activities and artifacts associated with using that technology.
4. Tailoring	• Provide guidelines on how and when to tailor this technology and this installation plan. • Define the mandatory requirements and the optional components or requirements. • Define options in terms of types of projects, types of functional areas, etc.
5. Education and Training	• Describe what training (formal or informal) and education is (a) required and (b) desirable for installation and use of this technology.

	• Define where and when this training or education is available, costs, lead times for reserving training seats, the process to be followed to request the training, and from whom it is requested.
6. Evaluation Procedures	Describe how the project or functional area will evaluate their installation and use. How will they know they have it right?
7. Work Breakdown Structure	Break the installation into small, manageable pieces that can be used as the basis for planning, reporting, and control. Define entry conditions and inputs, task descriptions, validation criteria, and exit conditions and outputs for each task.
8. Schedule	• Describe when each of the task elements described in the WBS are to be completed. Use Gantt or PERT charts. • Make key accomplishments into milestones and track against original estimates.
9. Resources	Describe resources required for this task, including personnel, money, computer resources, etc. Also describe who is responsible for each task.
10. Interfaces/ Dependencies	Each working group has an interface with other groups. Define and document these interfaces in this section.
11. Risks	Provide a basis for risk management and contingency planning.
12. Status/Monitoring	• Describe how status will be reported. (*Note*: Completed status reports should be appended to the plan to maintain a history of all activity.) • Discuss how progress will be monitored (comparisons of actual progress against proposed schedules). • Discuss how significant schedule deviations or changes will be handled.

C.0 Establish Organization Process Maturity Baseline

Purpose

There are many different ways to establish the process maturity baseline of an organization's strengths and weaknesses. Organizations have used a variety of assessment methods in the past, and new variations are constantly being developed. A variety of baselining methods are needed because of the differences between organizations: size, previous baselining activity, funds available, and so on. Rather than describe just one method, this appendix describes a generic series of assessment activities based on the Software Engineering Institute (SEI) capability maturity model (CMM) -based appraisal for internal process improvement (CBA IPI) method. The intent is to provide an understanding of the types and kind of activities involved in conducting a baseline. The software engineering process group (SEPG) should determine the type of baseline it wishes to conduct and get training on that method.

Appraisals that are based on the CMM use a set of common requirements that are described in the *CMM Appraisal Framework, Version 1.0*.[1] This document can be used by lead appraisers for training **appraisal team** members, by appraisal method developers for developing CMM-based appraisal methods, and by appraisal sponsors to determine if a specific appraisal method will fulfill their needs.

The organization process maturity baseline establishes the software process maturity level of the organization and identifies key areas for process improvement. The SEPG usually plans, organizes, and leads its organization's assessment. Following the baselining activity, the SEPG for-

1. Masters, Steve; & Bothwell, Carol. *CMM Appraisal Framework, Version 1.0* (CMU/SEI-95-TR-001). Pittsburgh, Pa.: Software Engineering Institute, Carnegie Mellon University, 1995.

mally documents the results of the baseline in a final report. The baselining team typically consists of the SEPG and other team members, drawn either from outside the assessment site or from within the organization.

A key step of a CMM-based software process improvement (SPI) program is identifying where the organization fits relative to the five levels of the maturity model. These activities identify a set of key issues that, if addressed, launch the organization on the road to improvement. The baselining activity can be considered successful if two goals are met:

1. A reasonable set of issues is identified and agreed upon by all involved, and recommendations are developed to move the organization on the road to improvement.
2. The organization becomes excited and interested in making changes at all levels, from the lowest practitioner to the senior manager. This activity contains some of the most stressing moments for the SEPG, both internally and in its relationship to senior management. It is this "cauldron" that can either forge the SEPG into a high-performing team or can break the team. The latter, if it occurs, usually leads to dissolution of the software process improvement (SPI) program.

Objectives

- Prepare the team and organization for conducting the baseline.
- Gather information on the organization's software process maturity level, identify key process issues facing the organization, and start to develop a set of priorities for improvement.
- Generate a report detailing all results of the baselining activity, including the findings that were presented during the final findings briefing at the end of the on-site period and recommendations for addressing those findings.
- Increase involvement and commitment throughout the organization.
- Identify barriers to change within the organization.

- Continue team building for the SEPG.

Entry Criteria

- The baseline method for software process maturity assessment has been selected.
- A team has been established and resources committed to conduct the CBA IPI.

See Figure C-1 below for a pictorial representation of the tasks associated with establishing a maturity baseline.

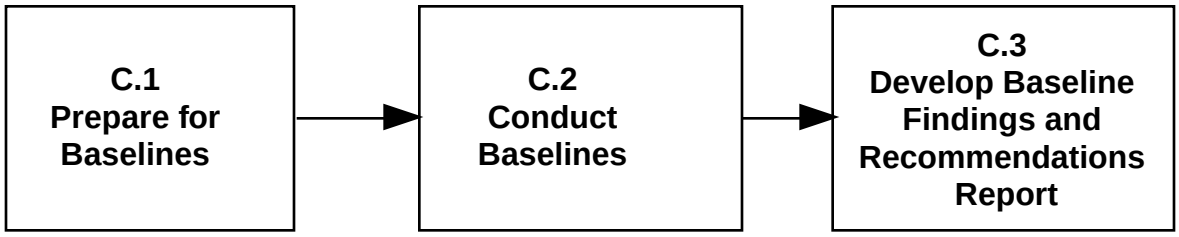

Figure C-1: Establish Organization Process Maturity Baseline—Tasks

Tasks

The tasks are shown in the table below.

Tasks	Page Number
C.1: Prepare for Baselines	206
C.2: Conduct Baselines	209
C.3: Develop Baseline Findings and Recommendations Report	212

C.1 Prepare for Baselines

Purpose

The purpose of this activity is to lay the groundwork for a smooth and successful baselining activity. A critical initial activity is to establish the scope of the baseline by identifying the parts of the organization that will be baselined and identifying the depth or level of coverage needed from the baseline. This is usually followed by selecting a team that represents those parts of the organization to be baselined and training that team in the specific baselining method chosen. Key baselining activity dates must be negotiated and finalized, such as dates for

- initial data-gathering and analysis
- detailed interviewing and definition of issues
- development of recommendations
- delivery of final report

Then the participants, particularly the projects and functional area representatives, must be selected and briefed on their roles and activities. The rest of the organization to be baselined must understand what will happen and how it relates to the SPI program. Typically this information is conveyed through a series of briefings. Detailed plans should be developed for all steps of the pre-baselining activity, baselining activity, and post-baselining activity periods.

Objectives

- Get a team trained in the baseline method selected.
- Determine the scope of the baseline and select projects and functional area representatives to participate in the baselining activity.

- Make the rest of the organization to be baselined aware of what a baselining activity is, how it fits into the overall SPI program, and what will happen in terms of activities and outputs during and immediately after the baselining.
- Finalize dates for the key baselining activity events and develop detailed plans and schedules for all activities.
- Prepare all logistics, materials to be used, files, templates, briefings, etc., and ensure that all tools, equipment, and materials are ready and in place.

Entry Criteria

A team has been established and resources committed to conduct the baseline.

Education/Training

A training session for an baselining team occurs during this phase. The purpose is to train a team in the specific mechanics and skill requirements of the selected baselining method as well as to provide any required background information.

Communication

Two groups have responsibility for most communication activities during this period: the management steering group (MSG) and the SEPG.

The MSG should publicly sponsor and support the baselining activity, preferably through individual staff meetings and at group briefings.

The SEPG will conduct informational briefings for the organization as a whole on what the baseline is, how it relates to the SPI program, and what will be happening. This is typically done through briefings to sections of the organization, with most of the people in that section attending along with the section's manager.

The SEPG should also brief the selected participants on their roles, responsibilities, detailed schedules, and the

overall baselining process, concentrating on how the participants' information is to be used.

Exit Criteria

All preparations are completed for the assessment. Invitations have been issued, **functional area representatives (FARs)** and project leaders are briefed, everything is scheduled and ready to go, and a complete dry run of the process has been satisfactorily completed.

Tasks

- Determine scope of the baseline.
- Select and train team in the baselining method chosen.
- Set expectations.
- Determine baselining participants.
- Finalize baseline dates, plans, and schedules.
- Prepare and test logistics for the baselining activity.
- Hold dry run or team walk-through of the baselining process.
- Plan development activities for the final report and recommendations.

C.2 Conduct Baselines

Purpose

The purpose of this activity is to conduct the baseline. This typically starts with an opening participants' briefing for all baselining participants, where the events, objectives, and schedules are reviewed. A questionnaire is filled out by the selected participants, and then the baselining team analyzes the responses to the questionnaire. The baselining team then prepares questions and areas to probe further for the detailed interviewing and issue definition period and decides what supporting material it will need to examine. The team finalizes plans and logistics for this follow-up period and then begins it.

Objectives

- Gather information on the organization's software process maturity level, identify key process issues facing the organization, and start to develop priorities for improvement.
- Build consensus on the issues facing the organization and develop excitement and enthusiasm for making necessary changes.
- Publicly report on the issues facing the organization and the strengths to build upon.

Entry Criteria

All preparations are completed for the baseline. Invitations have been issued, FARs and project leaders have been briefed, and everything is scheduled and ready to go.

Communication

Five groups have responsibility for most communications during this period: senior management, middle management, the baselining team, project leaders, and FARs.

Senior management should publicly sponsor and support the baseline establishment process and ensure that their line managers support the process as well, particularly by allocating time for the participants. Senior management

also should emphasize that open and honest responses are desired and should accept and acknowledge the findings.

Middle management should support the process and ensure that any of their people who are participating in the baselining process are able to be at their assigned activities on time and without interruptions.

The baselining team will be providing information to the participants on the process and detailed schedules. In addition, they provide feedback to participants and formally present the results of the baselining activities back to the organization.

The project leaders will be providing information about their projects and giving feedback to the baselining team about completeness, accuracy, and credibility of the findings.

The FARs will be providing their perspective on issues that get in the way of accomplishing their jobs. They will also identify strengths and provide feedback to the baselining team on the completeness and accuracy of the findings.

Exit Criteria

The on-site period has been successfully completed.

Tasks

- Brief baseline participants.
- Administer questionnaires and gather responses.
- Analyze responses and determine questions to be asked during interview periods as well as areas to probe in more depth.
- Finalize plans and logistics.
- Finalize preparation of supporting materials to be used during the interviewing period.
- Conduct detailed interviews and hold focus group discussions with selected participants.
- Identify issues and rank them.

- Gather feedback on the issues identified and refine them as necessary.
- Prepare and present a briefing to the management team and the organization as a whole on the strengths and issues identified and their consequences.

C.3 Develop Baseline Findings and Recommendations Report

Purpose

The purpose of this activity is to document the findings in more detail than was presented at the conclusion of the baselining period, and to develop recommendations to address those findings.

Typically the recommendations are developed through a series of brainstorming or focus group sessions held with practitioners, middle-level, and senior-level managers. The participants in each session are asked to brainstorm recommendations for each findings category. They are then asked to identify those recommendations that could be simply and easily implemented in a short period of time. Volunteers are solicited to start working on some of those simple improvements.

The baselining team then consolidates the recommendations from all the sessions and creates final categories and descriptions of recommendations. The findings and recommendations are combined into a report, which is circulated through the baselining team, the MSG, the SEPG, and other selected key stakeholders for review and comment. The revised findings and recommendations are put into a Final Findings and Recommendations Report, and this report is delivered, along with a briefing, to senior management.

Objectives

- Increase commitment of different levels of the organization by involving practitioners and middle and senior management in the process of developing recommendations.
- Develop recommendations for the organization to address the findings identified during the baselining period.
- Identify simple, inexpensive improvements that can begin immediately, launch those efforts, and start to track them.

- Submit a report and briefing of the baselining team's findings and the composite organization's recommendations to senior management.
- Secure senior management commitment to proceed to the next phase, action planning.

Entry Criteria

The baselining activity has been successfully completed.

Communication

Four groups have responsibility for most communications during this period: the MSG, middle management, the SEPG, and practitioners.

The MSG should publicly sponsor and support the recommendations process and ensure that lower level managers support the process as well, particularly by allocating time for the participants. Senior management also should provide input on recommendations in the senior management brainstorming session. Lastly, senior management will provide feedback and review on the report.

Middle management should support the process and ensure that people who are participating are able to be at their assigned activities on time and without interruptions. Middle managers should also provide their inputs on recommendations during their brainstorming session.

The baselining team will be consolidating information on recommendations, generating details on the findings and consequences, and facilitating the brainstorming sessions. They will consolidate, distribute, and brief the report.

The practitioners should provide their inputs on recommendations.

Exit Criteria

The baseline Findings and Recommendations Report has been delivered and briefed to senior management, and a commitment has been received to proceed to the Establishing phase.

Tasks

- Generate first draft of findings fragments.
- Conduct recommendations brainstorming or focus group sessions with practitioners, middle management, and senior management.
- Cluster, categorize, and merge recommendations.
- Generate first draft of recommendations fragments.
- Distribute, review, and update first draft with the MSG and other selected stakeholders.
- Develop briefing.
- Distribute, review, and update final draft report and briefing.
- Deliver report and brief recommendations.

Glossary

agents	The SEPG and others responsible for coordinating the day-to-day activities of the SPI effort.
appraisal team	A team trained in the CMM and an appraisal method who are chartered by the SPI sponsors to collect, analyze, and document software process data needed to meet appraisal objectives.
baseline findings and recommendations report	Report describing the current state in a specific area, with prioritized recommendations.
capability maturity model (CMM)	A description of the stages through which software organizations evolve as they define, implement, measure, control, and improve their software processes.
champions	Respected organization members who understand SPI and the CMM for software and who educate about SPI and advocate SPI in the organization.
discovery team	Team that explores issues and develops a SPI proposal to senior management.
executive council	Group in large organizations that defines strategy and direction for the organization's process improvement efforts.
functional area representative (FAR)	Representative of a specific software functional area (e.g., configuration management, testing, coding, etc.) who contributes to a discussion group during a software process assessment (SPA).
installation plan	Plan that defines steps for installing an improvement in a sub-unit of an organization.

line management	The first and second level of management in a medium to large organization whose focus is on the day-to-day activity of the organization.
management steering group (MSG)	Group responsible for linking the SPI program to the organization's vision and mission, demonstrating sponsorship, allocating resources, monitoring progress, and providing guidance and correction.
management steering group (MSG) charter	Document that defines the mission of an MSG.
middle management	Those levels of management between senior management and line management in a medium to large organization whose focus is on short- to mid-range business activities.
organization communication plan	Plan for creating organization-wide awareness and involvement with the SPI program.
organization strategic plan for software process improvement (SPI)	Framework for SPI in the context of the organization's business.
organization vision	A mental image of what an organization will be when its goals have been accomplished.
pilot	Initial implementation of an improvement, usually on a small, controlled scale, before general installation.
pilot plan	Plan that defines the steps for conducting a pilot in an organization.
practitioner	A person who is working within the software development framework.
process	The means by which people, procedures, methods, equipment, and tools are integrated to produce a desired result.
process action team	See *technical working group (TWG).*

process database	A repository of artifacts containing records of the data gathered and generated during the SPI process.
rollout strategy and plan	Definition of the strategy and plan for extending improvement to the organization.
senior management	The top manager and his/her direct reports in a medium to large organization. Senior management focus is typically on the longer range business activities.
software engineering process group (SEPG)	Group chartered by management to build and reinforce sponsorship of SPI, nurture and sustain improvement activities, and ensure coordination of the SPI effort throughout the organization.
software engineering process group (SEPG) charter	Document that defines the mission of an SEPG.
software practitioners	Technical professionals who develop, maintain and support software.
software process improvement (SPI) strategic action plan	Plan—based on the results of the baselining efforts, the organization improvement goals, and the resources available—which provides guidance for the overall SPI program and addresses how the long-range organization goals will be reached.
software process improvement advisory committee (SPIAC)	Forum in large or geographically dispersed organizations in which multiple SEPGs share experiences, lessons learned, and improvements accomplished.
software process improvement network (SPIN)	A group of individuals banding together to explore their common interests related to software process improvement.
software process improvement (SPI) proposal	Proposal that provides information to management that is necessary to launch a SPI program.

stakeholder	Person who has a specific interest and would be affected by decisions and/or changes in his or her areas of interest.
strategic business plan	Plan that specifies the business mission, business goals, and strategy the organization will pursue for achieving them.
tactical action plan	Plan that specifies charter, scope, and deliverables for specific improvement efforts.
target group	A group on which attention is focused with the intention of influencing them to change the way they approach their work.
technical working group (TWG)	Groups created to address a particular focus of the SPI program.
technical working group (TWG) charter	Document that defines the mission of a TWG.

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