

# Goal-Problem Approach for Scoping an Improvement Program

by Mary Sakry and Neil Potter  
The Process Group

*In this paper, we will explain an approach to scoping an improvement program based on problems and goals of the organization. By adopting this approach, organizations are able to make significant progress on real issues, and make progress on the process improvement model or standard they are trying to achieve.*

This article is reprinted courtesy of The Process Group Post Newsletter. It first appeared in that publication's September 1999 issue, Vol. 6, No. 2.

The most common approach for process improvement we have seen during the last 10 years is to document all processes. We do not know exactly why people do this, but they do.

This approach is amplified when an organization rushes to adopt a sweeping solution such as ISO9001 or the Software Engineering Institute's (SEI) Capability Maturity Model (CMM®). In the light of a goal stating, "Be SEI CMM Level 3 by December," the approach of documenting all processes is reinforced, and might even appear natural.

A process-centric approach can work, but it has a high risk of failure. To be successful, it must involve individuals who can internalize how the process documents will be used before they are completed. This is a rare skill.

The goal-problem approach starts with a business goal and

works backward to determine what improvement actions are necessary to achieve that goal. Here is an example.

During a client visit to help plan a process improvement program, we learned that the group was about to establish six teams to work on the six Key Process Areas (KPA) of the CMM Level 2. We suggested that the developers and managers temporarily forget about Level 2 and state all of their major problems. Then they were asked to state the goals they were trying to achieve over the next six to 18 months. After one hour of discussion, they created a list (Figure 1).

The next step was to have the group compare the list of problems and goals with the topics of the CMM. In Figure 1 we have listed the related KPA names and activities in parentheses after each item. If the client had been using ISO9001 or The

Figure 1. *Problems and goals list*

Problems	Goals
1. Get better requirements. Requirements tracking not in place; changes to requirements are not tracked; code does not match spec. at test time. [Level 2: RM - activities 1, 2, 3]	1. Orderly Plans for Development. [Level 2: SPP - activities 2, 5, 6, 7, 8, 13, 14]
2. Management direction unclear for product version 2.3. Goals change often. [Level 2: RM - activities 1, 3, verification 1]	2. Understand what our capacity is—develop one list of all the work we have to do. [Level 2: SPP - activity 7, ability 1]
3. Hard to revise project plan—items drop off, new things get added, plan is out of date. [Level 2: SPTO - activity 2, 8, 9]	3. Improve schedule tracking and communication of changes to impacted groups. [Level 2: SPTO - activities 3, 4]
4. Wrong files (e.g., DLLs) get put on CD—don't know what the right ones should be. [Level 2: SCM - activities 4, 7, 8, 9, 10]	4. Successfully deliver Serial Number Tracking product. [Level 2: RM - activities 1, 2, 3, SPP - activities 10, 6, 13]
5. Defect repairs break essential product features. [Level 2: SCM - activities 5, 7, 6, 9, 10, abilities 1, 2, 4, 5, verification 3, 4]	5. Improve performance of mainline software product. [Level 2: SPP - activity 11, SPTO - activity 7].
6. Customers are unhappy. There are approximately 300 outstanding defects that have not been addressed. [Level 2: SCM - verification 1, RM - activity 3; Level 3: IC - activity 1]	6. Identify needed skills for new designers and hire/promote and train accordingly. [Level 3: SPE activity 3, ability 2]
7. Difficult to find time to do critical activities (product development) versus crisis activities. [Level 2: SPP - activities 4, 10, 12]	7. Identify tools to support software developers. [Level 2: SPP - activity 14; Level 3: SPE - activity1]
8. Lack of resources and skills allocated to software design. [Level 2: SPP - activity 10]	8. Keep making a profit. Keep customers happy. [Level 2: RM - activities 1, 2, SPP - activities 10, 12, 13, SPTO - activities 4, 6, 8, 10, SQA - activity 5, Level 3: SPE - activities 2, 7, IC - activity 1, PR - goal 2]
9. Quality department—need team training (product and test skills). [Level 2: SQA - abilities 2, 3, 4]	9. Identify tools to support software testers. [Level 2: SPP - activity 14; Level 3: SPE - activity1]
10. Changes to specifications and documentation are not communicated effectively to documentation and test groups. [Level 2: RM - activities 1, 2, 3, SCM activities 7, 5, 6, 9, ability 1]	10. Empower Quality Department to have final say on product shipment. [Level 2: SQA - activities 6, 7]
11. Unreliable project schedule estimates. [Level 2: SPP - activities 9, 10, 12, 5, 13, 14, ability 4]	<p style="text-align: center;"><b>Definitions of SEI Level 2 Acronyms</b></p> <p>RM= Requirements Management SPP= Software Project Planning SPTO= Software Project Tracking and Oversight SQA= Software Quality Assurance</p>
12. Unclear status of software changes. [Level 2: SCM activities 8, 9]	
13. Testing does not necessarily comprehend things that matter to the customer. [Level 3: SPE activities 5, 6, 7]	

Malcolm Baldrige Award, we would have mapped the problems and goals to those documents.

### What was the Improvement Program’s Scope?

The scope was to address the problems and the goals of the organization. As you can see, 21 out of the 23 items (91 percent) map to Level 2. When all the problems and goals have been addressed, 46 percent of the Level 2 activities will have been addressed.

The key difference between this approach and addressing the six KPAs in parallel is that the problems and goals tell you which pieces of each KPA to address first. Regardless of the model or standard used, the problem-goal approach tells how to scope and sequence your improvement program.

### Items Not Matching Improvement Model or Standard

In Figure 1, not all of the problems in the list closely match the areas of CMM Level 2. For example, there is not much in the CMM to specifically address goal No. 5. In this situation, you have to determine which areas are most important for the organization to fix now. Serious problems should be worked on first.

### What is Learned from this Approach?

There are five significant lessons to be learned from adopting the goal-problem approach:

1. All process improvement can be meaningful.
2. The problems and goals help the organization identify which pieces of a model or standard to work on first. A model or standard should no longer be seen as providing an all-or-nothing approach, because this often leads people to do everything at once, regardless of whether it is appropriate. A model or standard can be treated as a large toolbox of little actions, ideas, and solutions useful at different times.
3. Any process document that is developed to solve a problem will be meaningful and useful. The process improvement team will be less tempted to gold-plate the process, since its scope will be defined by a problem.
4. The group’s motivation to work on improvement issues will increase. The improvements will be directed toward improving the group’s ability to produce software. Barriers to success will be solved systematically.
5. An organization will be focused on solutions rather than process documents. Some of these solutions will involve processes; some will involve tools or behavior changes.

### Using the Approach at a Project Level

Below is an example from a project at a different client. We asked the project manager for a significant project goal. From this goal we derived areas that needed improvement by asking two specific questions. These resulting problems formed the scope of the improvement program for this project.

#### What is your goal?

- Reduce release cycle to six to nine months.

#### What problems are preventing you from achieving the goal?

- Changing requirements.
- Loss of resources—difficult to replace people with specialized skills who leave the project.
- Too many features to put into a six- to nine-month development cycle.
- Poor quality of incoming code from other groups.
- Inadequate availability of test equipment.

#### What other problems do you have related to this goal?

- Lack of visibility within any life cycle phase—it is difficult to know whether we are ahead or behind schedule.
- Do not always have the resources available to complete the planned work.
- Difficult to find defects early.

We stepped through each of the answers and made a note of the KPA activity that could significantly help address the problem area. We recommended some of the more advanced Level 3 KPA components since this group was almost Level 2.

In this example, five out of the eight problems, or 63 percent, mapped to SEI Level 2, and 100 percent mapped to SEI Level 3. The scope of the improvement program should be the problems and goal. By addressing these, the project manager will make significant progress toward completing Level 2 and starting Level 3.

#### What questions helped you scope your improvement effort?

To scope the improvement effort, we asked the following questions:

1. State one goal for which you will be accountable over the next six to 18 months.
2. What prevents you from achieving this goal?
3. What other problems do you have related to this goal?
4. If you use a process improvement model or standard, which items help each of the problems listed? (Choose individual items at the detailed level, not large blocks of items.)

Figure 2.<sup>1</sup> Goal: Reduce release cycle to six to nine months

Problems	KPA component that would help this problem
Changing requirements.	Level 2: RM - activity 3, SCM - activity 5. Level 3: SPE - activity 2.
Loss of resources - difficult to replace people that leave the project due to specialized skills.	Level 2: SPTO - activities 2, 8. Level 3: TP - activities 1, 2, SPE - ability 2.
Too many features to put into six to nine month development cycle.	Level 2: SPP - activities 4,12,13. Level 3: SPE - activity 2.
Poor quality of incoming code from other groups.	Level 3: IC - activities 2, 5, 6, PR - activity 2.
Access to equipment to test code.	Level 2: SPP - activities 13, 14. Level 3: SPE - activities 6, 7.
Lack of visibility within any life cycle phase—it is difficult to know how much we are ahead or behind schedule.	Level 3: ISM - activities 7, 4, 11, verification 2. (ISM stands for Integrated Software Management.)
Do not always have the resources available to complete the planned work.	Level 2: SPP - activities 4,12, 13. Level 3: ISM - activities 3, 5, 10, 11.
Difficult to find defects early.	Level 3: PR - activities 1, 2, ability 1.

## Addressing all Items in Model or Standard Used

One primary concern with this approach is that an organization will not address all of the items in the model or standard used, since there might not be goals or problems related to all items.

When the first set of problems and goals have been worked, the next step is to repeat the cycle and determine the next set of problems and goals. This new set can be compared to the remaining items in the improvement model or standard. Over a one- to three-year period, each section of the model or standard will be matched up with a problem or goal.

For example, in the beginning of SEI Level 2, there may be little benefit to working on the process audit activity within Software Quality Assurance, since few processes are being followed. However, the need to audit a process becomes apparent once it has been defined, used, and proven effective.

One client highlighted this with its software release management process. Performing an audit on the related Software Configuration Management (SCM) activities would have been futile before the release management had been improved. When SCM and release management were in place, one employee bypassed the process and incorrectly released a software patch to a customer by e-mail. The software did not work and the customer was furious. The need for SCM auditing became apparent. After the audits, the developers and managers realized that they had a mechanism to verify execution of the defined release management activities.

There will be situations where some items of the model or

standard are not used when solving a problem or achieving a goal. These items should be left until the end of the improvement cycle. At that time, one of three scenarios usually occurs:

1. Outstanding items will be put to good use.
2. Items will be declared *not applicable*.
3. Items will be performed academically to meet the letter of the law. The focus should, of course, be on the first scenario.

## Conclusion

Scoping an improvement program can be difficult and frustrating. The task becomes daunting when a process model or standard is adopted wholesale. However, a simple, immediately available solution exists. The goals and problems of an organization can provide a timeless and effective scope for any improvement program. An improvement model or standard can then be used as a source of ideas, solutions and actions to achieve this scope.

The resulting improvement program is compelling, practical, and focused on the goals and problems of an organization. Using this approach, it is easy to implement process improvement in a phased manner, which provides people with timely solutions aimed at their specific needs.

## Note

1. Definitions of SEI Level 3 Acronyms:

TP = Training Program

SPE = Software Product Engineering

PR = Peer Reviews

IC = Intergroup Coordination

ISM = Integrated Software Management.

## About the Authors



**Mary Sakry** is co-founder of The Process Group, a company that consults in software engineering process improvement. She has 23 years of experience in software development, project management and software process improvement. For 15 years, she was a project manager and software engineer within Texas Instruments (TI) in Austin, Texas. In 1989, she worked on the TI Corporate Software Engineering Process Group TI to lead worldwide software process assessments. The last two years of TI were spent consulting and educating software developers and managers on software project planning, risk management, estimation, SEI CMM®, inspection and subcontract management. Sakry was the first SEI-authorized lead assessor for CBA-IPI process assessments. She has a master's degree in business administration from St. Edwards University, and a bachelor's in computer science from the University of Minnesota.



**Neil Potter** is co-founder of The Process Group. He has 14 years of experience in software design, engineering and process management. For six years, Neil was a software design engineer for Texas Instruments in Dallas, developing Electronic Design Automation software. The last two years at TI he was a Software Engineering Process Group manager consulting in the United States, England and India in the areas of software project planning, risk management, estimation, SEI CMM® and inspection. Potter is an SEI-authorized lead assessor for CBA-IPI process assessments. He has a bachelor's degree in computer science from the University of Essex in England.

The Process Group

Voice: 972-418-9541

Fax: 972-618-6283

E-mail: [help@processgroup.com](mailto:help@processgroup.com)

Internet: [www.processgroup.com](http://www.processgroup.com)

## 6th Annual JAWS S<sup>3</sup> is scheduled for June 25-30 in San Antonio, Texas

Over the years, the Joint Aerospace Weapon Systems Support, Sensors, and Simulation Symposium and Exhibition (JAWS S<sup>3</sup>) has addressed target acquisition, the dirty battlefield, the electromagnetic spectrum and its impact on smart and brilliant weapons, and a host of other relevant topics.

JAWS S<sup>3</sup> will focus on the connectivity of various levels of modeling and simulation and their connectivity in support of this mission. JAWS S<sup>3</sup> 2000 will feature senior-level decision-makers, who are in a position to impact the directions on these important defense issues, sharing their insights.

— Jim O'Bryon, Deputy Director, Operational Test and Evaluation/Live Fire Testing, Office of the Secretary of Defense

— E-mail: [varmaa@navair.navy.mil](mailto:varmaa@navair.navy.mil) for more information.