

WHY COACHES ARE NEEDED IN SOFTWARE PROCESS IMPROVEMENT

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INTRODUCTION

This paper defines an important role in software process improvement, the Coach. The Coach is different from the familiar roles of Sponsor, Champion, and Change Agent. The Coach combines expert knowledge of new practices and tools with expert leadership skills in change management.

Necessarily, coaches are everywhere in software process improvement. Despite this, very little has been written about what they do.

Organizations often confuse the Coach with other roles, and fail to use coaches well. Probably, software process improvement teams will perform better when their coaches do, just as sports teams with good coaches usually perform better than teams with poor coaches. It follows that organizations often can benefit from a better understanding of what their process improvement coaches do, and what they should be doing.

RESISTANCE TO CHANGE

Everyone knows about software process improvement (SPI) Sponsors, Champions, and Change Agents by now.¹ Coaches have been mentioned here and there in articles and meetings, for example in Gray and Stephenson² and in Gray³. Still, many SPI initiatives overlook their role and end up working too hard. Where they are used well, coaches are the spark plugs of the process improvement engine. It's time to clarify what they do so process improvement will happen faster and easier.

Humphrey⁴ makes the basic case that Sponsors, Champions, and Change Agents are needed to lead stakeholders through their resistance to process change. In a famous psychological study of death and dying, Kübler-Ross⁵ described five predictable stages of grieving over tragic news: (1)

¹ For other discussions, see, for example, the following:

- ◆ Fowler, Priscilla and Stan Rifkin, *Software Engineering Process Group Guide*, Technical Report CMU/SEI-90-TR-24, Pittsburgh, PA: Software Engineering Institute, 1990.
- ◆ Humphrey, Watts S., *Managing the Software Process*, Reading, MA: Addison-Wesley, 1990.
- ◆ Rogers, Everett M., *Diffusion of Innovations*, New York, NY: The Free Press, Fourth Edition, 1995.

² Gray, Lewis, and Dennis G. Stephenson, "Achieving Intergroup Coordination Through a Product Architecture Organization," in *Proceedings of the Seventh Annual Software Technology Conference* (HQ USAF/SC - USAF STSC: Salt Lake City, April, 1995).

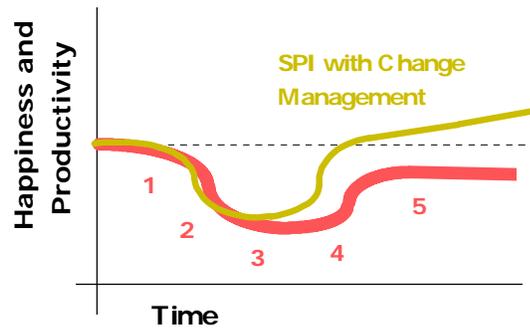
³ Gray, Lewis, "Defining the Coach's Role in Software Process Improvement," in *Proceedings of the Tenth Annual Software Technology Conference* (HQ USAF/SC - USAF STSC: Salt Lake City, April, 1998).

⁴ Humphrey, Watts S., *Managing the Software Process* (Addison-Wesley: Reading, MA, 1989).

⁵ Kübler-Ross, Elisabeth, *On Death and Dying* (Collier: New York, 1969).

denial and isolation; (2) anger; (3) bargaining; (4) depression; and (5) acceptance. Implementation Management Associates, Inc.⁶ and the Software Engineering Institute argue in their training that people subjected to process change go through the same emotional stages. These emotional reactions are the source of the resistance to change that Sponsors, Champions, and Change Agents must overcome.

Figure 1 summarizes the Kübler-Ross grieving cycle graphically. In the typical Kübler-Ross case, shown by the heavy dark curve in the figure, the cycle ends at a lower level of happiness and productivity than where it began. She studied people who were terminally ill. For these people, a happy, productive final state was not a possibility.



(Kübler-Ross, 1969)

Figure 1. Grieving Cycle With and Without Change Management

During software process improvement, an important rationale for doing change management has to be that if process change is properly managed people’s resistance will be shorter in duration and less intense, and their period of resistance will end at higher level of happiness and productivity than where it began. Unlike the people Kübler-Ross studied, for stakeholders who will be affected by process change a happy productive final state may be possible when the process change is well managed. A sample grieving cycle for well-managed process change is shown by the thin light curve in Figure 1.

There are some effective change management techniques that can be taught, such as the use of the SEI’s TXM⁷ and the roles of Sponsors, Champions, and Change Agents. However, organizations planning software process improvement should seek help from a successful SPI coach also because change management is a complex, sensitive task that must be tailored to each different process improvement effort. That is one of the Coach’s jobs.

The need for a coach comes from the other roles. Table 1 lists activities that usually are necessary for successful software process improvement. The table distributes the activities among four roles. Personnel assigned to the three roles of Sponsor, Champion, and Change Agent often will not be well suited to carrying out the Coach’s activities. That is the basic reason for a separate coaching role. What follows below explains what Sponsors, Champions, and Change Agents do in more detail.

⁶“Implementing Change,” (Implementation Management Associates, Inc.: Denver, CO, 1989).

⁷ The Technology Transition Model (TXM) is the subject of the Software Engineering Institute (SEI) workshop on “Introducing New Software Technology.” Further information on the workshop and the TXM model can be found at <<http://www.abelia.com/insterse.htm>>.

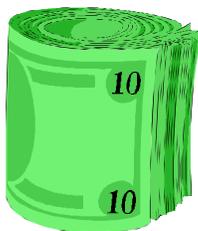
Table 1 Activities Necessary for Successful Software Process Improvement

<p>SPONSOR (has discretionary control of resources) Provides adequate resources to carry out the project</p>
<p>CHAMPION (has vision -- has influence within the parent organization) Conceives a process improvement effort Prepares a proposal for a process improvement initiative and explains it Supplies a rationale for funding process improvement Supplies needed infrastructure and training for process improvement Monitors process improvement efforts and results Conceives and justifies enhancements to the process improvement effort</p>
<p>CHANGE AGENT (has relevant base skills and willingness to change) Carries out improved practices as trained Corrects deficiencies in process improvement activities and products Completes all planned activities</p>
<p>COACH (has detailed technical and change leadership knowledge) Decides what must be done to improve the software process Decides how it must be done...what tools, methods, and procedures will be used Decides who will do it and how they will be organized Defines the process improvement schedule Selects appropriate infrastructure and training for the Change Agents Monitors Change Agent performance and product quality Updates the process improvement plan</p>

SPONSOR

The Sponsor's role is the easiest to describe. The Sponsor is the banker for software process improvement. The Sponsor guarantees that the Champion gets the resources that are needed for process improvement on time throughout the planned process improvement period.

This responsibility to fund software process improvement is often only a very minor part of the Sponsor's many concerns. And there may be many different reasons why a person would agree to sponsor a software process improvement effort, ranging from a bookkeeper-like attention to return on investment (ROI) to just a personal commitment to supporting the Champion.



A Sponsor must have total control over the resources needed for the process improvement initiative. Only then can the Sponsor guarantee that the Champion will get them on time as planned. Literally, the buck stops at the Sponsor's desk.

To summarize this role, one could say that the Sponsor owns and donates resources to the process improvement effort (for whatever reason the Sponsor finds compelling).

Typically, the Sponsor does not need to know the details of process change.

CHAMPION

The SPI Champion has three jobs: to initiate software process improvement, to promote it once it's under way, and to protect it from detractors and poachers.

First, the Champion initiates process improvement. This involves finding enough resources to do it properly, and then generating so much enthusiasm for process improvement that the organization budgets for it. The Champion usually recruits the SPI Sponsor. The Champion recruits the SPI Coach and collaborates with the Coach on an SPI action plan. The Champion selects the Change Agents with the help of the Coach.

Second, the Champion promotes process improvement while it's under way. The Champion is the public relations person for the effort. The Champion justifies process improvement to colleagues and staff, and when the organization wants a presentation on SPI, perhaps for a proposal, the Champion ensures that it is done properly.

Third, the Champion protects process improvement from detractors and poachers. Derogatory comments about process improvement stop at the Champion who defends the process improvement team against detractors. Poachers are managers outside the process improvement effort who want to pull one or more of the SPI team members off the SPI initiative onto other projects that need help. The Champion protects the integrity of the team against such poaching and defends the process improvement schedule.

Often, the role of Champion is an informal one, without a corresponding job description or funding. It's done in addition to whatever other responsibilities the Champion's real position within the organization may impose.

To summarize this role, the Champion has the vision and the influence to launch a process improvement effort and to keep it going. Typically, the Champion does not need a detailed, implementer's understanding of the new practices and tools.

CHANGE AGENT



Change Agents live and breathe the details of SPI. Their role is to make the changes that improve the organization's software process. Then, typically, they test the improved process on one or more example software development projects. These people are the players on the process improvement team. The Sponsor and the Champion could be compared to the team's owner and manager.

This is a tough, exciting job. The job is a prize in itself, and a burden. I recommend that it be assigned with care. Each process improvement team member must learn to work together with every other member. Team members must be able to trust one other. Resistance to process change will appear in unexpected places in your organization, and the Champion can never completely protect the team from it: so, Change Agents must cope with it. It helps if they are skilled and

respected by their peers. They should not be risk averse, and they must not be heroic prima donnas.

Change Agents follow the action plan supplied by the Coach. When they are criticized for what they are doing, they get protection from the Champion. When they need planned resources, they get them from the Sponsor via the Champion. When they make mistakes, the Coach corrects them.

In summary, Change Agents have the relevant base skills and the willingness to change successfully. They will learn and implement all of the details of the new practices.

COACH



Now we come to the need for a coach. To understand what the Coach does, let's consider two key questions. First, who prepares the process improvement action plan? Probably, it should not be the Sponsor or the Champion, because we cannot assume that they know enough about the details of SPI to plan it. Not the Change Agents, who might be chosen during the planning period, for the same reason.

Second, who corrects Change Agents when they make mistakes? Not the Change Agents themselves, for obvious reasons. Not the Sponsor or the Champion who, once again, may not know enough about process improvement and change management to do it.

In both cases, there is a clean fit to a fourth role in the process improvement effort. That is the Coach's role. The Coach plans the software process improvement effort, often in collaboration with the Champion. And the Coach corrects Change Agents when they make mistakes, and praises them when they perform well. A software process improvement coach is like a sports coach. The Coach tells the Change Agents what moves to make, but it's the Change Agents who are the actual players.

Unlike the other change management roles, the Coach's role is not defined usually in descriptions of software process improvement. One of the motivations for this paper is to clarify what coaches do.

A good coach is important to success. I recommend that an SPI coach finalize the action plan for process improvement, and supervise implementation of the plan. Unlike the Sponsor and the Champion, the Coach should be deeply involved in the implementation details of process change, like the Change Agents. Also, the Coach should monitor the performance of all of the other SPI team members to praise their good work and to correct their mistakes.

The Coach will have the most influence on the Change Agents. Nevertheless, the Coach should serve also as the Champion's confidant and adviser on SPI. In some cases, the Coach may play a similar role for the SPI Sponsor.

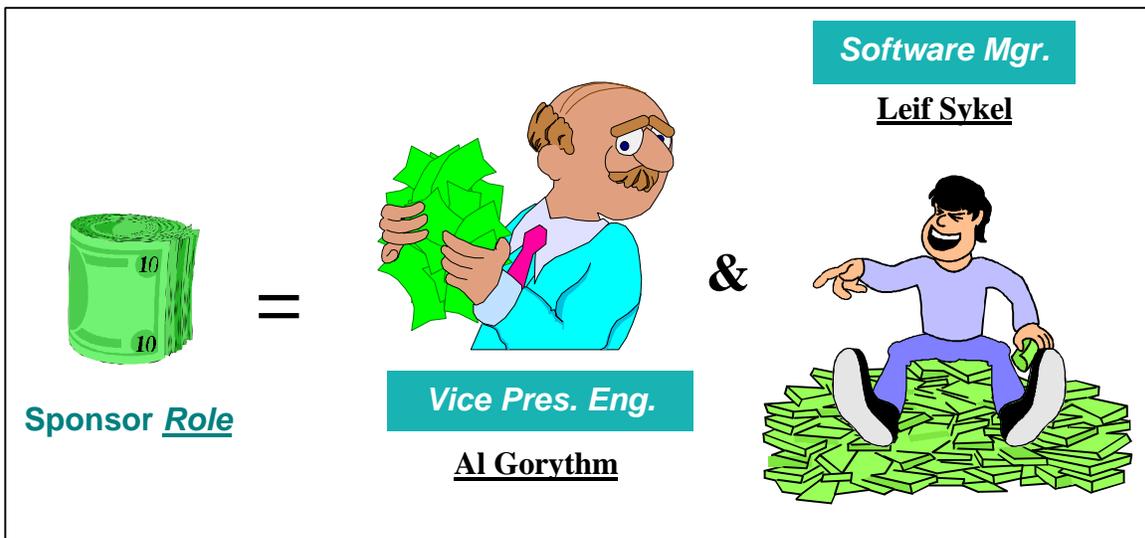
The Coach's role is where change management techniques are most evident. The Coach is most responsible for leading the other process improvement team members through the Kübler-Ross grieving cycle to a positive conclusion. It is easy to underestimate how difficult this is. Even process improvement team members may have occasional allergic reactions to what they are asked to do. The Coach is the team's consultant also on preventing and treating the allergic reactions of

other stakeholders in the planned changes who are outside the team.

To summarize the Coach's role, one could say that the Coach knows the improved practices and is skilled at introducing them.

Many organizations lack an experienced SPI coach. They should not hesitate to bring one into their process improvement effort from outside. Sometimes the organization has a Software Engineering Process Group (SEPG) with an experienced coach. Often, the Coach must be an outside consultant. Keep in mind, someone will plan the software process improvement effort, and guide the Change Agents. As a definition, I have called a person who does these things a Coach. These things will happen, for worse or for better. It is better for the organization if the person (or persons) who actually does them has the knowledge of the new practices and the skills in introducing new technology that are needed to be successful.

Figure 2. A Role May Be Carried Out By More than One Person in More than One Position



ROLES, PERSONNEL, & POSITIONS

Sponsor, Champion, Coach, and Change Agent are the four major roles when introducing new software technology. As Figure 2 suggests, any of these roles could be carried out by any number of actual personnel in the organization who may hold various different positions. I use the terms 'role,' 'personnel,' and 'position' in this paper in the following way:

- ◆ *Role* -- A collection of activities. A role has a name, such as Sponsor, Champion, Coach, or Change Agent defined by this paper and by much literature on software process improvement, and on technology introduction.
- ◆ *Personnel* -- One or more people in a project or its parent organization. Personnel have their own individual names.
- ◆ *Position* -- A box on an organizational chart for a project or parent organization. A position has a title assigned by the project or organization, such as Project Manager,

Technology Director, Quality Manager, SEPG Director, Process Action Team (PAT) Member, Software Engineer, Software Requirements Analyst, etc.

As an example, both a corporate vice-president and a mid-level manager might be sponsors of a software process improvement effort. The vice-president might be the initial source of funds for the effort. However, the mid-level manager might be allowed to divert the funds to other, more “important,” projects if the manager could provide a rationale for doing it. In such a case, a Champion must recruit both the vice-president and the mid-level manager as Sponsors if the funding from the corporate level is ever to reach the level of the Change Agents in the process improvement team.

One of the major reasons for focusing on what coaches do is that the personnel who carry out the roles of Sponsor, Champion, and Change Agent, regardless of what positions they may hold within their organization, can’t be expected to have the time or the knowledge about the new practices and the skills in technology introduction that are needed for successful coaching. Being a sponsor or champion often is not a part of anyone’s job description. Often, sponsors and champions do what they do in their “spare” time. Software process improvement initiatives that simply let coaching happen, by sponsors, champions or the change agents themselves, are likely to suffer a series of failures as a result, in the same way that a sports team would in similar circumstances.

QUALITIES OF A GOOD COACH

What makes a good SPI coach? In my opinion, it is many of the same qualities that make a good basketball coach or football coach. In an interesting article in *The Washington Post* Sports section, Justice⁸ writes, “Coach inspires players with respect, honesty, and unrelenting drive.” The Coach was Jim Lynam, Coach of the Washington Bullets basketball team. Indiana Pacers Coach Larry Brown told Justice, “What that team has done is what everyone strives for in this business.” According to Brown, “Jimmy Lynam has taken a group of players and gotten the absolute most out of them.” When Justice tried to explain how Lynam did it, he described coaching qualities that a good SPI coach should have too.

First, good coaches know their game and its strategies. I believe that good coaches are most likely to be found among former good players. In SPI, a good coach is likely to be someone who was a good software developer in an organization with a mature software process.

Second, good coaches have a sense of humor. They can put work in the proper perspective. Excellence isn’t based on drudgery, it’s based on fun.

Third, honesty...good coaches are straightforward.

Fourth, trust. I have found this to be critical to process improvement. Change Agents must trust their coach. SPI can’t proceed when the SPI team constantly second-guesses the Coach. Trust is built on honesty and success.

Fifth, Lynam communicates well. SPI coaches must be able to explain to Change Agents how to carry out the activities of a mature software process. Coaches have to know when their explanations are getting through and when they’re not. When team members don’t understand

⁸ Justice, Richard, “Bullets Take Heart From Lynam,” in *The Washington Post*, Sports, April 10, 1996.

them, coaches have to find another way to package the message so that it is understood.

Sixth, respect. A good SPI coach listens to team members when they raise an objection.

Seventh, don't hold a grudge. Richard says about Lynam, "if he chews out a player during a game -- and he does it frequently -- he has a one-on-one chat the next day to explain his actions." An SPI coach may have little control over who is chosen as an SPI team member. The Coach discovers a way, if there is one, to make the given team successful in improving the software process. Personal antagonism between the SPI Coach and a team member, or between two team members, usually blocks long-term process improvement. The Coach must find a way to avoid or defuse antagonistic situations.

Eighth, put negative reactions from team members in the proper perspective, don't take them personally. A coach must understand that even change agents will have negative reactions to the pressures of change from time to time. Usually these reactions are not directed personally at the Coach, and the Coach must not act as though they are, unless they really are.

Finally, focus on what can be done. I emphasize the word 'can' here. Don't dwell on what can't be done or waste time grieving about it. For example, there are many different ways to do each of the key practices in the CMM. Some ways use tools to make it easy. For example, requirements management, software project planning, and software configuration management can be much easier to do with decent software tools than with pencil and paper. Nevertheless, pencil and paper are much underrated as tools. Organizations that can't afford the proper software tools have to adapt. They shouldn't give up on the key practice. They have to learn to do it a different way that doesn't require tools that they can't have. The Coach must look for what the SPI team can do, and show the team how to construct a mature software process that builds on that. An SPI coach never lets the SPI team give up so long as there is a reasonable probability of success.

RESOURCES ON COACHING

Readers who want to understand SPI coaching better can get a good start in Humphrey.⁹ Humphrey says, "We have not yet developed a coaching ethic in software development. It could certainly help if we did. Sports and the performing arts have learned the value of coaching...It seems unlikely that truly superior software development performance will be achieved without the help of skilled coaches."

For further exploration of coaching as an organizational activity, see Curtis,¹⁰ the SEI's P-CMM (People Capability Maturity Model). Recognizing the value of coaches, SEI has placed coach development in the P-CMM, as a Level-5 activity. Coach development is hard, but hiring a good coach is much easier. For most organizations, I recommend that you should consider the key coaching activities in the P-CMM to be a checklist of what to look for in a prospective SPI coach.

⁹ Humphrey, Watts S., *A Discipline for Software Engineering* (Addison-Wesley: Reading, MA, 1995).

¹⁰ Curtis, Bill, William E. Hefley, and Sally Miller, *People Capability Maturity Model* (SEI: Pittsburgh, 1995).

CONCLUSION

In conclusion, I have a pop quiz for you, the reader. I'll leave it to you to score your own responses. Pick any actual software process improvement initiative (or software technology introduction effort) within your project or parent organization. Using the descriptions above of the four roles of Sponsor, Champion, Coach, and Change Agent, and restricting your answers just to your actual initiative, can you answer:

- ◆ Who (what *Personnel*) are the *Sponsors* for that initiative? What *Positions* do they have within your project or parent organization?
- ◆ Who (what *Personnel*) are the *Champions* for the initiative? What *Positions* do they have within your project or parent organization?
- ◆ Who (what *Personnel*) are the *Coaches* for your initiative? What *Positions* do they have within your project or parent organization?
- ◆ Who (what *Personnel*) are the *Change Agents* for your initiative? What *Positions* do they have within your project or parent organization?

Now, ask yourself: if no one is filling one or more of the four roles, how do you think the initiative that you have in mind will work around not doing the activities in Table 1 associated with those roles? No one is filling the roles, so no one seems to be doing the activities...do you have one or more risks to the process improvement initiative here? Should you be tracking these risks in your process improvement risk matrix?