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Capstone Exercise

Leading a Development Team  
Software Engineering Institute

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Capstone Exercise

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| **Overview** | This document provides responses to the questions posed in the *capstone exercise.* |

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| **The situations** | The following situations are presented in this document. |

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|  | **Situation** | **See page** |
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The “Hard Luck” NOVA Team and Your New Assignment

Part One

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| **How do people feel when they are constantly under pressure and delivering below expectations? What do you expect the morale level of this team is?** |

When teams are behind schedule and striving to meet what the members feel is an unrealistic schedule, they typically put in excessive time at work, feel too rushed to do quality work, often waste time excessively reworking their poor-quality products, and complain about lost family time.

These symptoms are typical of teams that have an unsatisfactory performance history, a poor management reputation, low morale, and high turnover.

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| **What is your reaction to the request?** |

First, before exploring the job, think about whether or not the job seems interesting and is something you would like to undertake. If not, do not take the job. If you decide to proceed and before making a decision, address the following four questions.

* 1. What does management think are the team’s problems and their causes?
  2. What does the team think are their problems and causes?
  3. What do you think should be done to fix these problems?
  4. Will management support you in implementing these fixes?

Some possible steps to take in answering these questions are the following.

* Meet with the manager who asked you to take this job to understand what he or she thinks are the team’s problems and their causes.
* Also discuss this question with any other involved managers.
* In these discussions, ensure that all the involved managers agree to your talking with the TSP coach and the team members before accepting the job.
* Do not talk to the coach or team until you have management’s agreement to do so.
* If management does not agree to your meeting with the team, but you feel that you should, do not take the job.

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| **What would you ask management to do to help ensure your success?** |

While your specific actions must depend on what you learned in talking with management, the coach, and the team, you would most likely need management help with the following points.

* First, assuming that the project is seriously behind schedule, ask management for their continuing need for the project, even if it is late. In doing so, explain that your objective as team leader would be to recover as much lost time as possible, but that you must first understand the likelihood of your ultimately being successful.
* If management agrees that they would still want the project even if it was late, ask for their support in holding a new team launch and in their participating in meeting 1 to explain their needs as they now see them.
* If management agrees to support the relaunch, explain how you plan to proceed with the team and that you need management’s agreement to replace any team members who do not wish to remain on the team.

Resistance to Training

Part Two

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| **How would you handle the conversation with the developers?** |

After listening to all of the team members, make a list of their key issues and concerns and then meet with the TSP coach to get his or her thoughts on how to handle them. Also, tell the coach that you plan to meet with the entire team to discuss their issues and to ask them if they would like to meet with you and the coach for further discussion.

Regarding their comments, the following are some points to consider in talking with the team.

* The problems were not the team’s fault but management’s.

Tell the team that this is not a blame game. The project is in trouble and there is plenty of blame for everybody. Point out that their job is to fix the problem—not to place blame. A key TSP principle is that project problems are usually caused by process and practice problems. People generally want to do good work, but their processes and practices are faulty. So tell them that their job is to fix their processes and practices and not to worry about blame.

* The PSP course is hard and not relevant to their situation.

The answer to the first issue leads right into this one. Management does understand that the team’s problems are caused by poor processes and practices, and they have decided to fix these problems at the source instead of merely addressing symptoms. That means that the team must learn how to define and use processes and how to follow best practices when they use these processes. PSP training is necessary because few software developers know how to make plans and to manage quality.

Also point out that thousands of software developers have completed PSP training. While the course is challenging, this is a competent team and you are confident that they can do the PSP assignments. They must treat the PSP course as part of their jobs and recognize that, in this organization, good work is not an option, and it is a requirement. Urge them to approach the PSP course as a learning experience and as a way to further their technical careers. This course is just as important as their other project assignments and they should give it their full energy and commitment.

* PSP training is putting them further behind schedule.

This point reflects a misunderstanding of how the PSP course relates to their work. Experience has shown that for projects like NOVA, products produced by PSP-trained teams are typically of such high quality that their system test times are cut by many months. By completing the PSP course and learning to properly use the PSP methods, they will accelerate the project.

Also, remind the team that there is no schedule and no commitment until the team completes the launch.

Finally, management has decided that this team will use the TSP. This requires that the team members all complete PSP training. This is part of their jobs. They are paid to take this course; it is not an option. Be cautious in discussing this point, however, as it could appear threatening to the team members. You want them to trust and confide in you, not to be afraid of you.

End this discussion by expressing confidence in their ability to do the PSP assignments and to do a great job. Your objective is to motivate each team member to learn to make accurate estimates, to gather and use the PSP data, and to strive to get 100% yields on their PSP programs. You might even promise to throw them a party when they all complete their PSP assignments.

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| What steps would you take to help the developers be successful in completing the course? |

While you should ask the team members what help they need in completing the course, the following are some steps that would likely be helpful.

* At a minimum, sit in the course during the morning sessions. Some team leaders have chosen to take the course and complete the programs with the team.
* Emphasize that during the course and until they have completed all of their PSP assignments, the PSP is their number one priority.
* They should not worry about their project work until they have completed all of the outstanding course work. After completing week one, and once they have completed the first week’s programs and the interim report, they can do project work until week two starts. Then they should again give the PSP work their top priority.
* In addition, tell them that the coach has agreed to meet with any team member who needs help and to either provide that help or find someone who can.
* Finally, if any other problems come up during the course where you can help, urge them to get to you right away.

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| How can the TSP coach help? |

As already noted, you should take full advantage of the TSP coach’s skills and abilities.

* Ask for his or her suggestions on how to handle the team’s issues and concerns.
* If the team would like, have this individual meet with you and the team to discuss their issues and concerns and ask the coach to provide help and support to any of the team members who need it.
* Also, ask the coach to meet with you daily, if possible, to keep you posted on class progress, and to alert you to any problems the team members are having.
* Finally, ask the coach to tell you right away if any team member does not appear to be trying to do a good job with the PSP assignments.

The TSP Launch of the NOVA Team

Part Three

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| What do you do? |

Explain to the team that this is a normal issue for first-time TSP teams and that, unfortunately, the key facts are in dispute.

* First, management wants a high-quality product delivered to the customer in nine months.
* Second, with the organization’s prior development practices and without using inspections, the team would provide a poor quality product to test in five months, systems and acceptance testing would take six months, and they would deliver a poor-quality product in eleven months. This would be two months late.
* Third, by following the TSP and doing inspections, evidence from other organizations shows that the team would provide a high-quality product to test in six months, testing would take three months or less, and they would deliver a high-quality product in nine months. This would be precisely on management’s desired schedule.
* Fourth, the testing group is skeptical of these claims and will not agree to a shorter testing schedule until they see evidence that the TSP will actually produce such results for this organization.

Since there appears to be no way to get team consensus on this issue, you, the team leader, must make a decision. Before you do, however, explain your views and get the team’s comments.

* First, the team will plan to follow the TSP process and do the inspections.
* Second, the team will produce a quality plan with inspections and estimate the test and delivered defect levels and test times.
* Third, the team will produce an alternate quality plan without inspections and estimate the test and delivered defect levels and test times.
* Fourth, in meeting 7, the team will assess the risks of these choices.
* Fifth, in meeting 9, you will present both plans and explain why the team plans to do the inspections and deliver a high-quality product.
* Sixth, you will explain that the test groups disagree with the team’s test-time estimate and believe that three additional months will be needed.
* Finally, the team will commit to delivering a quality product to test in six months and you recommend that the company commit to a twelve-month customer delivery date. This would minimize the risk of missing a customer commitment.

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| How can the TSP coach help? |

The coach can help in these discussions by providing data on the TSP test-time and delivered-product-quality experiences of other organizations. He or she should also participate in the discussions and help explain the benefits of team inspections.

Behind!

Part Four

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| What do you do? |

First, thank Kurt for his positive attitude and agree that the problem could just be a blip. However, also point out that you can’t go to management with just a positive attitude; you must have a recovery plan. You need to know

* precisely why the team is falling behind schedule
* what the team plans to do to catch up
* how they are going to stay on schedule from now on

Next, ask Kurt to lead an effort to develop the team’s recovery plan and to get back to the team for a 4:30 meeting this afternoon. He should call on whoever he needs from the team and contact you and the coach for any help he needs from either of you. Then, in the meeting this afternoon, have the team

* review Kurt’s proposed recovery plan
* make whatever changes they collectively feel are appropriate
* assign responsibilities for the required actions
* develop a set of milestones and dates to track recovery progress

If Kurt needs to reach you at any time today, ask him to interrupt you and you will give this top priority. Explain that you must have this recovery plan in place before you can go back to management to answer their request for the added feature.

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| How can the TSP coach help? |

Tell Kurt that if he would like any guidance and input from the coach on his proposed action items or on how other teams have handled similar problems, the coach is available and has agreed to help. Also ask the coach to join you and the team for the 4:30 meeting and to advise you and the team on the recovery plan.

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| What do you tell management about the request? |

Once you have the recovery plan, you have a sound foundation for estimating the impact of the new feature that management has requested. After you and the team have estimated the impact of this feature, go to management and tell them the following.

* Before estimating the impact of the requested feature, you and the team assessed your status against your current commitments and found you were about 10% behind schedule.
* At the present rate of progress, the team would be about four weeks late entering system test.
* Also point out that you and the team do not accept this delay and are still committed to meeting your original delivery commitment. To do this, the team has developed a recovery plan.
* Then, briefly explain this plan and its key milestones.
* Finally, describe the impact of developing the added feature that management has requested and explain how much it would add to the team’s current schedule.

Explain that, at this point, the team is unable to commit to providing the added feature without slipping the schedule by the extra time required to develop that feature. However, once you have completed the team’s recovery plan, you will reassess the team’s ability to further accelerate the work and to recover the additional time required by this new feature.

The Skipped Detail-Level Design

Part Five

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| What do you do? |

The first step is to tell Antonio and Sanjay that you will talk to Mary. Before you do talk to her, however, separately discuss your plans with the coach and with your manager. Mary has already had several disagreements with you and the team and you suspect that you might need management’s help in dealing with her. Once the coach and your manager agree with your plan for dealing with Mary, meet with her and have the following discussion.

* First, explain that the team has agreed to produce detailed-level designs and to inspect those designs.
* Also explain that you understand she had attended an inspection meeting the other day and said that she did not plan to produce a detailed-level design for her module. Then ask her to explain how she planned to handle these detailed-level designs and why.
* Assuming that her story confirms what Antonio and Sanjay told you, explain to Mary that most competent programmers like her can write small module-sized programs without first producing detailed-level designs.
* However, for this system, the module designs are needed by many other people. For example the other developers, the testers, the writers for the maintenance and user manuals, and all of the people who will eventually maintain and enhance this system will need some design materials.
* She can certainly write the program code first and then produce the detailed-level design later if she prefers, but she must produce the designs and have them inspected.
* Then tell Mary that producing the detailed-design for this module and getting it inspected is her top priority and that you would like her schedule for that work by tomorrow morning.
* If Mary agrees to get back to you with this schedule, follow up with her, Antonio, and Sanjay to make sure that she does.
* If she does not agree to do this, tell her that this is a serious issue and that you will get back to her in a day or two to further discuss the matter.

Then, talk to your manager and the personnel department to obtain their agreement to the idea of telling Mary that producing these designs is a requirement of her job. If she is unwilling to produce these designs, she will have to be replaced on the team and, if she can’t find another job in the organization, she will be terminated.

While this is a very firm way of handling this kind of problem, it is important to remember that, as team leader, you are part of management. It is also important to realize that some people are naturally difficult to handle. They will test you to find out precisely how far they can push you. If you do not handle this problem promptly, Mary will be setting the team’s basic practices and standards and you will be team leader in name only. Pretty soon you won’t have any followers.

Experience shows that, by promptly and firmly dealing with people like Mary, over 90% of these problems are solved right away. With few exceptions, once they realize that they must follow your direction, such people become capable and productive employees.

If someone disagrees with how the team should do the job, the time for that discussion was during the team launch. Mary disagreed with doing the inspections during the launch and could not convince the team. It is now clear that her real objection was not to the design inspections, but to having to produce designs. Now she must follow the agreed-upon process, or leave the team.

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| How can the TSP coach help? |

While the coach should typically not be involved in personnel issues, he or she should be called on for help in explaining your rationale for requiring the detailed-level designs and for any help that Mary and the team needs in producing or inspecting those designs.

Checkpoint Results

Part Six

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| What do you do? |

This problem is very different from situation 5. There, Mary was refusing to do her job the way the team had agreed to do it. By assuming the role of the strong leader, you quickly solved that problem. Here, you have two seemingly different problems that have identical character, and you must address them both as different aspects of the same problem. However, you must handle them very differently from the way you took care of situation 5.

The entire team has agreed to produce detailed-level designs and the members all know how to do so, or at least they have been taught how to do so. However, they are making haphazard and rather inadequate efforts to produce these designs and the results are so poor that their effort is essentially wasted. Similarly, the team has agreed to gather defect data, or at least they have not disagreed with gathering it. They also know how to gather defect data and have even done so in PSP training. However, the quality of their defect data is so poor that it is almost worthless and their data-gathering efforts have been largely wasted.

In addressing these problems, your objective must be to motivate the team to produce really good designs, to properly and thoroughly review and inspect these designs, and to completely gather and properly use their defect data. To have any chance of accomplishing this, you must follow a strategy much like the following.

* First, assume that the team members are motivated and capable people who want to do good work.
* Second, recognize that they need to know what good work looks like.
* Third, set and maintain high standards for the work and insist that they strive to meet these standards. While these are your standards, you want the team to understand them, be willing to use them, and agree to strive to meet them. Emphasize to the team that nothing less is acceptable.
* Fourth, the team members must always know how the team’s performance compares with your standards. In informing them, however, do not embarrass any individuals. Follow the general rule of critiquing poor individual work individually and publicly praising quality work. Publicly praise good work by both individuals and groups.
* Fifth, focus on improvement actions—not blame or excuses.
* Sixth, have patience and do not expect rapid improvement. This will be a long and slow process.
* Seventh, celebrate even the small successes.
* Eighth, focus on where the team members need help. Consider how they might rebalance their work, rearrange their roles, obtain added training, or benefit from one-on-one coaching.
* Ninth, keep this a public process. Tell the team what you think, what you are going to do, and how they did against your standards. Make sure that no one on the team is ever surprised by what you say or do regarding these standards and their performance against them.
* Tenth, keep your management informed about what you are doing, why you are doing it, and the progress the team is making. Don’t criticize the team to your management but use this as an opportunity to describe the team’s improvement efforts and achievements. Your attitude should be that, while this team isn’t perfect, it is highly motivated and really striving to do a great job. Keep your eye on them – they are going to do unbelievable work.

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| How can the TSP coach help? |

In this improvement effort, involve the coach in every step. The coach could be helpful in almost every aspect of this work. For example, most coaches can provide useful insight and perspective on defining design and data standards, measuring and displaying team performance, coaching individuals, celebrating results, and much more.

Low Yields in Personal Reviews

Part Seven

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| What do you do? |

This situation is a continuation of the standards issues discussed in situation 6. Here, however, the problem is a bit different. Presumably the team members are striving to meet your standards, and presumably the yield targets were established in the team’s quality plan. This time you have already done much of the needed preparatory work and you can concentrate on fixing the specific problem. However, you don’t have just one problem. You potentially have ten different problems, and they could each have different solutions.

The reason that there are ten problems is that there are five team members and you are concerned about the design-review and code-review yields for each member. Since the reasons for low design-review yields are different than for code-review yields, and since each member almost certainly has different personal review practices, you must start by obtaining some facts.

* Ask the quality manager, with the coach’s help, to examine the design-review and code-review practices and performance of each team member.
* The quality manager and TSP coach should help the team identify the common team problems as well as those problems that are specific for one or two team members.
* The quality manager and coach should recommend team-wide improvement actions as well as unique actions for each individual team member.
* In the team meeting, have the team, under the guidance of the quality manager and coach, develop a plan to address the recommended team-wide actions. In this plan, the team should define measurable improvement milestones that the quality manager can track and regularly review with you and the team.
* You should ask the coach and quality manager to meet with each team member to develop a personal yield-improvement plan with agreed and measurable milestones that they can track.
* As the quality manager and coach do this work, have them meet with you daily to brief you on their progress and the team’s and team members’ performance against their milestones.
* When a team member misses a milestone, meet with that member, the quality manager, and the coach to review the situation and agree on next steps.

Some of the key ways that individuals can improve personal reviews include the following.

* Do the reviews on paper. Conducting reviews on screen have been shown to be less effective.
* The author should take a break before conducting a review. The author may want to start developing another component before reviewing the component just completed.
* The reviewer should understand the *types* of all defects that have escaped and compare those to the code review and design review checklists. Are all of these defects being checked for? If not they should be added to the checklist(s).
* The reviewer may need to review more slowly. It has been shown that code review rates that exceed 200 lines of code per hour are less effective.

In addressing the yield problem, the key is consistency and persistence. If you are consistent and persistent, the team will respond. However, remember that it will take time.

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| How can the TSP coach help? |

The coach must be involved in all aspects of this situation: fact gathering, action planning, and improvement.

System Test Is Going Great!

Part eight

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| What is your response to being two months ahead of schedule? |

The test results are great news, so you need to do six things.

* First, tell everybody how much you appreciate their great work.
* Second, make sure that you and all the team members thank the team coach for all of their help in making this achievement possible.
* Third, start making arrangements for a team party to celebrate the team’s great work. Also arrange for your immediate manager and senior management to drop in on the party and express their appreciation.
* Fourth, arrange with the coach for a thorough project postmortem, and be sure to document the postmortem results in a final report that you place in the project file.
* Fifth, as part of the postmortem, hold a defect review meeting to examine the data on every defect found in final system and acceptance testing, determine where it was injected, why it was not found earlier, and what process changes are needed to both prevent and promptly find these types of defects in the future.
* Sixth, start arranging for the team’s next project so you and management can announce it at the team’s party.

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| What is your response to the lack of recognition for success? |

The recognition problem should be a wake-up call for you and the coach. The problem is that really superior work looks so easy, it is almost invisible. Highly-skilled professionals (e.g., trapeze artists, violinists, and programmers) seem to do their work so naturally and effortlessly that it looks simple. However, anyone who knows what is involved will instantly recognize that this natural performance is the result of lots of dedicated hard work. These types of performers are now so good at what they do, that they do great work naturally. Throughout the project, you should have been describing the team’s hard work and their progress to management.

* While their plan performance, data gathering, and review yields may have been below your and their expectations, they were already doing much better work than they or anyone else in the organization ever did before. You need to keep management aware of their hard work and steady progress throughout the project. Make sure that management sees the effort spent and understands how hard the team has worked to achieve each improvement milestone.
* While it is now awfully late to start building this case, you, the coach, and the team need to put together a factual story about how much better this team has performed than any other prior team in the organization. You also need to explain what their success means in business terms. Put this story together as quickly as you possibly can and review it with senior management before your team party.
* Also prepare some notes for management to use at the party when they make a few remarks about the team’s work. Once management has explained to the team what their success means to the organization, they are likely to understand and remember what this team has done