

BEST PRACTICES

# SOFTWARE CHANGE MANAGEMENT



## Instructor's Manual

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# Introduction

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The purpose of this manual is to guide classroom discussions of topics within the book *Software Change Management: Case Studies and Practical Advice*. Questions are posed and answers are provided for each of the chapters in the book. The emphasis of the discussions is to highlight issues in software change management and techniques that can be used to resolve them.

The figures and tables referenced in this manual can be found in the corresponding chapters of the book.

## Discussion Questions

The questions posed in the remainder of this manual can be either used for discussion in class or given as written homework. My hope is that college and university students will respond with meaningful answers after they think about the questions. Each question is aimed at making the case deliberations interesting and unique. So have fun and enjoy them. Hopefully, your students will be energized and many lively debates will result.

# Chapter 1: Getting Started

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## On Need

1. Do you believe a book emphasizing case studies about change management has value? If not, why not?
  - Have students describe why a change-management book is important in organizations that they have been part of.
2. Does the structure suggested for presenting cases make sense?
  - If the structure needs changing, have students provide reasons for the alterations they propose.

## On Roles

1. Can you think of any additional roles needed to facilitate change in an organization?
  - There are several other roles that I can think of, including quality assurance personnel, partners, vendors, and other suppliers.
2. For new roles, can you identify the responsibilities?
  - For example, I would have software quality assurance personnel focus on ensuring quality is preserved as warranted changes are implemented. For partners, I would have them embrace the change-management principles as equal stakeholders. This is especially true when the partner is part of the team, is contributing to the product, and is using compatible processes.
3. Does the organizational change-implementation cycle displayed in Figure 1-2 make sense?
  - If changes or additions are proposed, have students explain why they are needed. The current process might need altering when outsourcing or contracting is involved because the change agent might not be involved in the change process.

## On Making a Difference

1. Are there other reasons for implementing change within an organization?
  - There are lots of additional reasons for change. The key question here is "Are they important enough to expend resources to expedite the change?" For example, extending marketing/sales reach with direct channels overseas instead of using trading partners might make it easier to place more organizational emphasis on sales. This, in turn, could increase motivation to make changes quickly, especially if a steady stream of products and services are a by-product of the increased sales. This should be an interesting discussion.

2. How would you rank the reasons in order of importance?
  - The way to figure out what is important is to look at the rankings and filter out the reasons that fall to the bottom of the list.
3. What criteria would you use to determine your rankings?
  - All criteria should be quantitative and revolve around providing added value relative to achieving business goals. Measures such as return on investment (ROI), return on capital (ROC), and other such business measures should be considered.

## On Resistance to Change

1. Are there other barriers to change you can think of?
  - Again, students should be able to list lots of other barriers. A key question is "Are the new ones more important than those listed in the book?" I would, therefore, rank barriers by potential impact and reorder the list accordingly.
2. How would you rank the barriers in terms of difficulty?
  - Difficulty ratings should revolve around what you can and cannot control. For example, you can control the work environment. Therefore, making changes to the environment should be easy. In contrast, you cannot control management interference or political issues that permeate most organizations. This will require more senior people to facilitate altering the climate for change. For this reason, such barriers might be considered much more difficult to overcome.

## Chapter 2: Industrial Case: Organizational Change

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### On Organization

1. Has the organization retained its focus on business goals?
  - Considering that the organization conducts distribution across two continents, discuss whether or not the organization can retain its goals by distributing work as pictured in Figure 2-2.
2. Is this the optimum organizational structure for the firm?
  - Although it is cheaper to decentralize operations, would it be better to centralize it and move customer support to the USA because of complaints about service?
3. Are there clear lines of communications and accountability?
  - Ask students how they would change the organization to improve the lines of communications and accountability.
4. Is there sponsorship and leadership for change?
  - Who would you solicit to be the sponsor for change, and what levels of leadership in each organizational entity would be your champions?

### On Project

1. Have those fostering change been given adequate time and resources?
  - Are three people enough to achieve the levels of change desired in the organization? If not, why not?
  - Do you think the consultant should be replaced by a company person? If so, why?
2. Has the IT organization embraced risk-management principles to reduce the negative consequences of the change?
  - The entire subject of Enterprise Resource Planning (ERP) seems to be full of risks. Yet, there has been little discussion of the use of risk-management processes. Should this topic be added to Table 2-1 as the tenth issue and recommended action?
3. Have teams been built to facilitate change, and is there adequate leadership and focus?
  - Of course, the answer is "no." But does the recommended action plan shown in Figure 2-4 offer a path to resolve this issue?



## On Process

1. Is there strong executive support for change management?
  - The opportunity to brief executive management is an opportunity to build such support. Have students list who needs to be convinced based on the information provided by the case, as well as why these people are essential and not others.
2. Have those who are advocating for change addressed the process needs by developing a process framework for change?
  - Checklists are always nice to have, but they do not represent a process that can be used to provide sustained change. Have students provide a flow chart illustrating how to go about instituting sustained change in organizations.
3. Have supply-chain management and licensing processes been adequately addressed as part of the change-management processes?
  - According to Figure 2-2, everyone seems to be relying on commercial off-the-shelf (COTS) and open-source packages. Each organization seems to do its own thing relative to supply-chain management. Should this be changed and, if so, why?

## On Product

1. Has the focus on product quality been lost as the organization increased its emphasis on change?
  - Perhaps a way to retain focus on quality would be for the Product Management group to lead the change initiative. Discuss whether or not this is a good idea.
2. Are the product features being implemented still traceable to user needs and requirements?
  - This is a good question that the case does not fully address. Ask your students how they would go about finding out the answer.
  - Would you put improved traceability recommendations in your executive briefing, or is this suggestion too low level for their consideration?

## On People

1. Have change-management roles and responsibilities been defined, and are they understood by the workforce?
  - Ask students if this question is premature or if you need to define roles at startup so that you can get people thinking and get management to approve them.

2. Has the workforce been adequately trained in change-management approaches?
  - There has been no training yet. However, the organization realizes training is needed. Where does the organization purchase such training, or does it need to develop the training itself?
3. Does the organization making the changes hold people accountable for results?
  - Accountability and measurement need to be incorporated into plans. How are both measured (using what measures and metrics)? This is a good discussion topic.
4. Are interdisciplinary teams built and used to facilitate change within the organization?
  - This is yet another thing to worry about. How do you facilitate change across international organizations? How should teams be organized and built?

## On Issues

1. List the issues, and rank them in priority order.
  - As noted, the largest issue seems to be quality. But the root cause of the issue is not identified. Has enough information been gathered to determine the cause? If not, what should be done?
2. What criteria do you use to develop your rankings?
  - Other issues are listed in Table 2-1. But we already identified more issues, such as accountability and communications. Ask students to expand the list and rank items according to their impact on quality because it is the underlying reason this organization wants to change.

## On Outcomes and Lessons Learned

1. Are the outcomes predictable?
  - The actions listed in Table 2-2 are predictable when you view the case in retrospect. Actually, these actions represent the tip of the iceberg.
2. How could you have influenced the outcomes to get more positive results?
  - Results, estimates, and measurement go hand in hand. To really understand what is needed, a change-management plan is needed along with a task breakdown, schedules, and estimates. Measures of success are also needed that are tied to accomplishments mapped out by the plan. Ask your students to develop a task list and estimates of what it would take to accomplish them. They will then see that the actions listed in Table 2-2 are necessary, but not sufficient to achieve success.

3. Are there other lessons learned that should be added to the list?
- The lessons most notably missing revolve around the plan. It needs to be noted that without such a plan, there is no hope for success because the roadmap that is needed to weave a path through the obstacles that impede change is not available.

# Chapter 3: Industrial Case: Process Improvement

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## On Organization

1. Has the organization retained its focus on business goals?
  - The organization in Figure 3-1 has more structure than that of the last case study. There is a clear separation of duties. Each remote organization is held accountable, and there is an apparent focus on handling banking operations and support.
2. Is this the optimum organizational structure for the firm?
  - The clear way to determine an answer to this question is to look at results. For example, what is the cost as a percentage of the operating budget for IT, and how well does that compare with other banks? Are there other comparable yardsticks the bank could use to make such determinations and findings?

## On Project

1. Is there sponsorship and leadership for change?
  - In this case, the Process group has leadership for change responsibilities, and there is sponsorship at executive management for it. However, Figure 3-3 indicates that this sponsorship has not been consistent in the recent past. This is an issue that needs to be worked on at the highest levels, perhaps by making such change part of each executive's bonus plan. Are there other ways of building more consistent sponsorship and support that your students can think of?
2. Have those fostering change been given adequate time and resources?
  - The way to determine whether schedules and budgets are sufficient is to look at the work plan. Because this is detailed in the next few sections, this would make a good discussion topic for the class.
3. Has the organization embraced risk-management principles to reduce the negative consequences of the change?
  - Because we know the Capability Maturity Model Integration (CMMI) framework the organization selected, we know that it has codified its risk processes and institutionalized them. However, we do not know their details. Do we need to know this to make a determination and finding?
4. Have teams been built to facilitate change, and is there adequate leadership and focus?
  - The insistence that the North Carolina and Philippines groups be included in meetings is a good move. The decision relative to their nonparticipation should be reviewed, and they should be tasked to have change leads report to the Process group, who should be held responsible for leading the update and maintaining focus.

## On Process

1. Is there strong executive support for change management?
  - The Process group has been in business for years and has had support. However, it is apparent that this has varied as new executives have joined the firm. The Process group understands that it has to build this support continuously. Ask students if they have any ideas about how they could increase support at the executive levels.
2. Does it make sense for the group providing customer support in the Philippines and those in North Carolina operating the mega-center to adopt the processes used in New York?
  - The Software Engineering Institute also has a CMMI framework for services. This framework might be more applicable for the Philippines and North Carolina groups.
  - Another key consideration is the use of common practices and tools for such support services as configuration management (CM), quality assurance (QA), supplier management, measurement, and others. The class might want to discuss whether or not these should be standardized across organizations.

## On Product

1. Is a focus on product quality appropriate for justifying process improvement efforts?
  - Many argue that the elimination of escapes (defects caused in one stage of development, such as design, escaping to another stage like integration and test) can be used to justify process improvement efforts because the relative cost to fix a defect early is so much cheaper than fixing it later. Just how much this works and whether it does is a good topic for discussion, especially if any of your students have experience with such situations.
  - Many process groups at high levels of maturity reinvent themselves and take up the banner of Six Sigma to justify their continuance. This is another good discussion topic, especially for classes that are interested in Kaizen (which means “change for the better” in English) and other Japanese approaches to quality.

## On People

1. Have change-management roles and responsibilities been defined, and are they understood by the workforce?
  - The organization has been involved in change management for some time. As such, roles should be well understood. The question is how to continuously engage the community and perpetuate roles. In addition, roles change as organizations and people change. The key question raised by this case is what can be done differently to get stakeholders to buy into the changes that need to be made.

## On Issues

1. List the issues, and rank them in priority order.
  - One of the major issues raised was whether or not a process group was really needed. The lesson learned in the community is that process groups have to reinvent themselves as process maturity is raised organizationally to continuously justify themselves. An approach that works is to embrace other initiatives, such as Six Sigma, as part of this reinvention process. Another approach is to use measurement data to continuously justify the initiative based on the cost and benefits.
2. How would you go about resolving the top five issues?
  - You should be able to determine the top five issues after ranking them based on impact. The quality data described in the case identifies the large number of defects identified in the Philippines as a concern. Perhaps tasking the Process group to develop ways to resolve this and other quality issues could be their new lease on life. Ask your class what they think about these options.

## On Outcomes and Lessons Learned

1. Are the outcomes predictable?
  - The issues are predictable. They are also avoidable. The literature is full of similar examples. See if your students can cite any of these.
2. How could you have influenced the outcomes to get more positive results?
  - The Process group could have partnered with the Quality Assurance group to address the quality problems being experienced in the Philippines sooner.
  - The Process group needs to expand its outreach so that it can network with others to identify and eliminate the issues that occur early. This is something that could be done to influence Process group actions in the future.
3. Are there other lessons learned that should be added to the list?
  - Perhaps the organization could learn to budget Process group activities once they are justified on a multiyear basis instead of year to year. Give them a set of goals, and let them achieve those goals.

## Chapter 4: Industrial Case: Moving to COTS

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### On Organization

1. Has the organization retained its focus on business goals?
  - The move to a new architecture with major new user-suggested features is driven by one customer. Perhaps more customer input would enable the firm to enhance the architecture to accommodate more of its client base and achieve even greater sales and profitability. At a minimum, a market survey is needed to determine what percentage of the customer base approves of the new architectural direction.
2. Is this the optimum organizational structure for the firm?
  - The involvement of the customer should be lauded. However, getting them and other clients engaged throughout the development cycle is needed. Perhaps some form of Integrated Product Team with a customer representative on it is warranted. I would discuss this and other optional ways of getting continued customer input in class.
3. Are there clear lines of communications and accountability?
  - Just developing a new product is half the battle. The other half of the fight revolves around deciding how to launch the product and support it in the field. The third half of the battle (that is, the overtime you spend) is to convince the existing base to replace existing systems with the new product. It is a battle that requires inputs from the customers and other organizations affected. Perhaps these lines of communications and accountability can be incorporated into the plan for the new system. (They are not yet.) Ask the class what tasks need be accomplished to achieve this end.
4. Is there sponsorship and leadership for change?
  - Marketing and the support of one large customer is not what most people would call *sponsorship*. Yes, 20 percent of the customer base is responsible for 80 percent of the sales. But the goal is to broaden sales while keeping existing customers happy. What approaches would the class suggest to get the sponsorship needed to achieve these broader goals?

### On Project

1. Have those fostering change been given adequate time and resources?
  - The task list is focused on the development of the new architecture, and it fails to address all of the other tasks needed to launch and get customers to convert to the new architecture. The task list that was developed previously should be considered as part of the budget in Table 4-1 and the additional resources should be made available when needed to make the architecture update project a success.

2. Has the organization embraced risk-management principles to reduce the negative consequences of the change?
  - No evidence is provided to indicate “yes” or “no.” However, change management is not something that projects like this worry about. They are more focused on meeting objectives and delivering product.
3. Have teams been built to facilitate change, and is there adequate leadership and focus?
  - Again, this is not likely because of the focus on the project rather than on the organization. This is a good discussion point because it shows some of the failings of the project focus. Projects are focused on the delivery of product even when they are pursuing major technical changes.

## On Process

1. Is there strong executive support for change management?
  - Moving to COTS and the issues involved is a project issue. No decision has been made yet as to whether this is the right way to go for the organization. If this decision was up for consideration, each of the major projects and the Engineering department would have to get involved. As this occurs, executive support for the change would be needed to alter the policy and decision framework used by the firm for multiyear decision-making.
2. Have those who are advocating for change addressed the process needs by developing a process framework for change?
  - This is not on their radar yet. They are too focused on the near-term task of moving to the new architecture to worry about change management.
3. Have supply-chain management and licensing processes been adequately addressed as part of the change-management processes?
  - Not yet. They are being addressed by the project and not by the organization. This is a shame because the organization could save money by adopting enterprise licensing and avoid future worries by using this project as the pathfinder for future jobs that would employ COTS and open-source software as their mainstays.

## On Product

1. Has the focus on product quality been lost as the organization increased its emphasis on change?
  - No gating process was discussed relative to checking COTS and open-source package quality either as part of the selection process or as part of their installation prior to use. Such tasks need to be added, along with a market-watch function that looks for alternatives through the life of the program if the vendor goes out of business or the product no longer



supports functions deemed essential by the project. At least Table 4-4 suggests putting a copy of COTS vendor software in escrow in case the vendor goes out of business.

2. Are the product features being implemented still traceable to user needs and requirements?
  - There is no effort aimed at looking at traceability between requirements and COTS or to ensure that the open-source product has been mounted as part of the selection process. Most projects trace feature lists deemed essential to product characteristics. Such a task needs to be added and budgeted for by students as they come up with the additional task list.
3. Is there a clear evolutionary path available for the product?
  - No discussions were held with the vendors to discuss this, and no relationship manager has been assigned to help influence the course of product development. Perhaps there are yet additional tasks that need to be budgeted.

## On People

1. Have change-management roles and responsibilities been defined, and are they understood by the workforce?
  - Necessary roles and assignments have not been made relative to change management. The entire topic of transition to a COTS-based architecture has been overlooked. Have your students discuss the roles needed to fill the vacuum.
2. Has the workforce been adequately trained in change-management approaches?
  - One of the key topics for the discussion related to roles is who needs to be trained and how they should be trained as the COTS-based architecture is transitioned into operations.
3. Are interdisciplinary teams built and used to facilitate change within the organization?
  - No, but they should be, especially as plans are made for both development and transition. Have your students discuss what teams are needed and who should be part of them. For example, is an Integrated Product Team needed to work on both development and transition issues, and should engineers, maintainers, users, customers, and others be part of it?

## On Issues

1. List the issues, and rank them in priority order.
  - The engineering issues have been discussed. Table 4-4 lists the risks and, therefore, the issues that result. However, the organizational issues involved in transitioning to COTS and the issues associated with deploying a COTS-based architecture have not been even thought about yet. Issues for these two topics need to be pinpointed and elevated to the “top 10” based on organizational rather than project impacts.

2. How would you go about resolving the top five issues?

I would rank the following issues as the top 5 based on potential impacts such as the following (students may choose other issues):

- **The architecture's fitness for use** The new architecture must provide at least the current capabilities and performance of the system it is replacing. Otherwise, why would anyone buy it? In response, a performance-measurement function should be added to benchmark system performance as an ongoing function throughout the life cycle.
- **Mapping desired features to product capabilities** Such mappings are needed to convince those sponsoring the work that the new architecture will be worth migrating to once the system is ready to be deployed to the field.
- **Hidden license costs** There might be substantial additional license costs when the architecture is deployed (run-time licenses in addition to development licenses).
- **No control over migration path** COTS might evolve along a different path, resulting in replacement with a higher cost alternative.
- **Poor customer service** Nothing alienates users more than poor service. Often, poor service results because the workforce has been overwhelmed by issues due to poor quality. Root cause analysis should help you figure this out.

## On Outcomes and Lessons Learned

1. Are the outcomes predictable?

- Results are predictable for this stage of development. There are always those who have second thoughts. Their questions need to be answered. However, the failure to address organizational and deployment issues is a recipe for disaster. Issues involved here are also predictable, and the firm needs to do something about them.

2. Are there other lessons learned that should be added to the list? Consider some of these:

- Change-management principles should have been applied at the project level to address the transition to the use of the new architecture and the changes needed to foster its optimum use in operations.
- Roles and responsibilities for change management should be assigned at the project level, and those filling these roles should be trained to do their jobs.
- The tasks associated with change management should have appeared in project-level schedules. Budgets should have been allocated so that each task could satisfactorily deliver the promised results.
- There will be major problems in the future operationally if the project does not step up to address both organizational and deployment issues by at least developing appropriate plans at this stage of development.

- Opportunities to save money are being missed by embracing enterprisewide, licensing supply-chain management processes at the organizational level.
- A mapping between desired features and product capabilities will provide customers with confidence that the new architecture will address their needs.
- A relationship manager should be assigned to influence the direction vendors take in the future so that their products continue to satisfy the organization's needs.

## Chapter 5: Industrial Case: Small Defense Project

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### On Organization

1. Has the organization retained its focus on business goals?
  - The primary business of a small business is business. That is its focus, and it responds accordingly when opportunities present themselves.
2. Is this the optimum organizational structure for the firm?
  - Small organizations like this one involve everyone in everything. As expected, they tend to be driven by events that shape them. Fluidity is a plus, therefore, and too much structure could be dangerous. Ask students to discuss how to avoid too much structure.
3. Are there clear lines of communications and accountability?
  - In small organizations where staff is co-located, people talk and are held accountable for results. When people fail to deliver, they are asked to seek opportunities elsewhere. There is no room in most small business for dead wood.
4. Is there sponsorship and leadership for change?
  - Small businesses respond to change rapidly, especially when potential new business is in the offing. Ask students to discuss whether they know of a high-tech small business that was so set in its ways that it failed to change.

### On Project

1. Have those fostering change been given adequate time and resources?
  - Those on the staff who are involved in change in this case are so busy pushing paper that they have not even thought about what changes are needed to accommodate the growth resulting from the Small Business Innovation Research (SBIR) program contract award.

### On Process

1. Is there strong executive support for change management?
  - By definition, change-management processes are fluid in a small business. Executives and workers are making whatever changes are needed to secure a new contract.
2. Have those who are advocating for change addressed the process needs by developing a process framework for change?
  - Yes and no. Those who are advocating for change are the customers. However, the changes they want made are focused on what they need to track and reward contractual progress. The firm is responding by doing whatever is necessary to win the business.

## On Product

1. Has the focus on product quality been lost as the organization increases its emphasis on change?
  - Yes, the entire focus of the exercise seems to be on contractual, cost, and legal matters. The customer seems not to care about innovation or quality. They seem more interested in compliance issues. Have your students discuss this and recommend what the government could do to reward quality.

## On People

1. Have change-management roles and responsibilities been defined, and are they understood by the workforce?
  - The entire staff has accepted the role of change manager. They will do whatever is needed to get the contract. However, the government is neither being reasonable nor constructive. Change will happen, but will it be for the better? Only time will tell.
2. Has the workforce been adequately trained in change-management approaches?
  - The workforce will need to be trained in the changes dictated by the government, not in change-management approaches. These are dictated, and there is no room for variation. Ask your students if they believe such change will result in improvements.
3. Are interdisciplinary teams built and used to facilitate change within the organization?
  - The approaches used by the government are neither interdisciplinary nor consensus based. They dictate what is required, and you do it. The penalty for noncompliance is that no contract is awarded. They practice the golden rule—they have the gold, and they make the rules.

## On Issues

1. List the issues, and rank them in priority order.
  - The issues all revolve around the contract requirements imposed by the government. They will alter the way the firm does business because their accounting, legal, personnel, compliance reporting, and other requirements dictate what happens. The question you should pose for discussion is “Does it make sense to take this contract?” Yes, you can get funds to grow the firm, but at what cost to you and your employees?

## On Outcomes and Lessons Learned

1. Are the outcomes predictable?
  - Yes, the load posed by the government’s requirements on the project manager and staff is overwhelming. Questions for discussion should include the following: Will staff quit? If

these are the starting requirements, will the government get tougher and tougher as the contract progresses? Will the government ever be satisfied? Will the burden ease once processes and procedures to address the requirements are solidified and fine-tuned?

**2.** Are there other lessons learned that should be added to the list?

- The best way to deal with an unreasonable customer is to summon help from higher levels of government. In this case, perhaps enlisting support from your representatives in Congress or from a high-level Department of Defense (DoD) official might be a last resort. However, be advised that this will anger the contracting officer and might not yield the results hoped for because he or she typically reports independently up a different chain of command.
- Another way to address unreasonable requirements is to cite a similar contract where such clauses were not invoked. Then ask why you are being treated differently. This packs more punch when the requirements are being imposed on small and not large businesses.

## Chapter 6: Industrial Case: Cloud Computing

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### On Organization

1. Has the organization retained its focus on business goals?
  - From the organizational chart, it is apparent that IT is viewed as a support function and not as a revenue producer. As such, IT's business goals revolve around supporting business functions, not utility services.
2. Is this the optimum organizational structure for the firm?
  - The failure to put IT as a separate department on the organizational chart shows that the utility company views this function as subordinate to others. Because the organization has 1,500 people in it, it might make sense to call out the IT department separately.
3. Are there clear lines of communications and accountability?
  - Because IT's role is subordinate, communications and accountability are hampered. If the department were raised higher in the organization, it would function as an equal partner with its sister groups. It would also be held more accountable for results because it would be rated in terms of profit and loss like everyone else at that level.

### On Project

1. Should a project be formed to investigate making a technology change like moving to cloud computing?
  - Conducting a study looking at cloud computing seems appropriate because it is aimed at getting decision-makers the facts that they need to decide whether or not to move ahead with the concept.

### On Process

1. Is there strong executive support for change management?
  - Executive support for a major change that reduces cost by eliminating the need for capital and staff resources can always be found because executives are always looking for ways to get the job done faster, cheaper, and better.
2. Have those advocating for change addressed the process needs by developing a process framework for change?
  - The process for change is classical and perhaps documented by a practice or procedure. First, there is a feasibility study. If this shows potential based on the numbers, the team will be given the go-ahead to develop a plan. If the project still looks good, a team will be formed and given the job of implementing the plan. Progress will be tracked against

the plan, and expectations will be directed toward delivering the benefits promised when approvals were given.

## On Product

1. Has the focus on product quality been lost as the organization increased its emphasis on change?
  - The issue of quality of service has not received prominent enough attention. Those looking to the clouds seem focused on the cost/benefit calculation. They seem to believe the vendors who promise at least the same levels of service for users as is being delivered presently. To confirm this will be the case, the team should talk with firms in similar industries to determine if the vendor is stretching the truth. In addition to the level of service quality for their users, the team should also look at the service quality that the vendor provides.
2. Are the product features being implemented still traceable to user needs and requirements?
  - It is difficult to trace user requirements to the cloud. It seems that the best you can do is trace to feature sets. Performance issues dominate because they are variable and outside of your control. For example, what is promised is an average response time, not a hard deadline.
3. Is there a clear evolutionary path available for the product?
  - At first, there was a clear path. However, this is changing with time. It probably will evolve to something different than originally promised. The path will be a function of all of the customer's demands, not just yours. So, what results over the next few years may be very different from what you expect.

## On People

1. Have change-management roles and responsibilities been defined, and are they understood by the workforce?

The move to cloud computing has just started. As the case illustrates, there is lots of resistance to change at the executive level. Change represents a threat to the existing order. As part of the move to the clouds, roles and responsibilities will have to be defined. In addition, supply-chain management functions will have to be strengthened because cloud services will be provided by an external source, and strong contract-management skills will be needed in order to succeed if and when they are utilized.



## On Issues

1. List the issues, and rank them in priority order.

While cloud computing represents a way to cut costs, there are lots of issues related to it. These range from supplier management to security in the cloud. The following list of “top 10” issues represents just a starting point for your discussions:

- Cloud Performance
  - Cloud Reliability
  - Cloud Security
  - Cloud Capabilities
  - Cloud Compatibility (with internal systems, including clients)
  - Cloud Quality of Service (to the user community)
  - Cloud Transition and Cutover Costs (including education and training)
  - Cloud Infrastructure Modification Costs (policies, practices, procedures, and so forth)
  - Vendor Support and Responsiveness
  - Vendor Management (strengthen supply-chain management) and Costs
2. What criteria do you use to develop your rankings?
    - Criteria used for ranking are a function of who is developing them. At the enterprise level, they are a function of the impact on company policies, procedures, and budgets. At the operating unit level, they are focused on the user and user satisfaction measures. Both viewpoints are important and should be discussed when arriving at a solution.
  3. How would you go about resolving the top five issues?
    - The “top 5” issues always seem to revolve around what capabilities and performance you get and for how much money. However, in the case of cloud computing, security needs to be one of these top 5. The reason for this is that the firm’s exposure in the cloud is greater when vulnerabilities are present.

## On Outcomes and Lessons Learned

1. Are the outcomes predictable?
  - Yes, because the cloud represents a much cheaper way of doing business. Although politics are present in this case, the options portrayed seem reasonable.

2. How could you have influenced the outcomes to get more positive results?
  - Perhaps, you could have presold the opposition on the idea by conducting some one-on-one meetings with them. But having opposition to a new idea is not always bad. In many situations, it makes you dig deeper to sharpen your arguments for or against something new.

# Chapter 7: Industrial Case: Agile Methods

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## On Organization

1. Has the organization retained its focus on business goals?
  - This project is driven by marketing. Because the need is based on competitive reasons, resources are not a problem. But the pressure to deliver is. The question to ask is whether it is a good idea to try something radically new when under such pressure. Some will answer “yes” because Agile promises a stream of deliveries starting really early. But these interim products are not industrial grade and should not be distributed. Knowing the people in marketing, you expect that once they see something produced they will want to sell it. Is Agile a good idea then?
2. Are there clear lines of communications and accountability?
  - The organization has several organizations involved that are geographically separated. This adds complexity to communications and accountability that can be dealt with only by clear delineation of responsibilities. Such delineation has not yet been made, and there may be some issues here that need to be discussed by students.
3. Is there sponsorship and leadership for change?
  - In this case, sponsorship and leadership for change comes from the developers. Senior management does not care how the product is developed. They only care whether it gets done quickly and that the resulting products are high quality.

## On Process

1. Is there strong executive support for change management?
  - Yes, this is a “must do” project that everyone agrees must be done successfully.
2. Have those who are advocating for change addressed the process needs by developing a process framework for change?
  - The process for change is evolving as the project evolves.
3. Have supply-chain management and licensing processes been adequately addressed as part of the change-management processes?
  - Supply-chain management has not hit the radar yet. However, it will soon because some of the products will be licensed from third parties for distribution as part of the offering. Either that will happen, or the firms that supply them will be acquired because this is much easier than developing some of the tools anew. However, licensing responsibilities do not show on the organizational chart, and perhaps the team should recognize this as a whole. This is a great discussion topic for the class.

## On Product

1. Has the focus on product quality been lost as the organization increased its emphasis on change?
  - The project is not collecting defect information as builds are made and products are delivered. It is focused on delivery. Based on these facts, one can conclude that delivery rather than quality is the primary goal. What could the firm do to address this issue? Perhaps it could task its product assurance organization to play a more active part in development as part of the Agile teams?
2. Is there a clear evolutionary path available for the product?
  - The issue of evolution of the product offering has not even been identified. People are being driven to deliver, and evolution will come afterward. However, the architecture must be designed to accommodate such evolution, especially in terms of the middleware standards that are embraced. Discuss how this apparent paradox could be handled.

## On People

1. Have change-management roles and responsibilities been defined, and are they understood by the workforce?
  - Team leaders seem to be working together to resolve process issues as Agile techniques are being harnessed to get the product line out. There seems to be lots of activity and not a lot of interference yet by management and marketing. Technical roles have apparently been worked out. However, little or no attention has been paid to institutionalizing the changes once the project is completed.
2. Does the organization making the changes hold people accountable for results?
  - If teams do not deliver what is promised per the delivery schedule marketing is dictating, heads will roll. Under such circumstances, how can the software team set realistic expectations and communicate them to management and marketing?
3. Are interdisciplinary teams built and used to facilitate change within the organization?
  - There has been little attention paid to interdisciplinary teams. The project has made no provisions to use the independent test group to qualify its products and the beta test group to coordinate field testing with selective users. The project has neither addressed user support nor quality assurance roles. Perhaps use of interdisciplinary teams that engage these functions could correct this situation. This is another good discussion topic.

## On Issues

1. List the issues, and rank them in priority order.
  - According to Tables 7-3 and 7-4, everything is on schedule at month 6 and nobody should be worried. Do you really believe this? Is this software project in trouble? How would you go about finding out?
2. How would you go about finding out the true status of the project?
  - Would it be beneficial to institute some sort of velocity or rate of progress measure as advanced by the Agile community to determine whether the project will deliver on time? Should defect measures be captured as well to assess the quality of the deliverables, and should rework measures be collected to determine whether the team is spinning its wheels doing nonproductive work?

## On Outcomes and Lessons Learned

1. Are the outcomes predictable?
  - While the outcomes are predictable, one can argue that confidence in the team will ebb and flow as products are delivered. One can predict that panic will reoccur and that weekly reviews will be requested as deadlines near. What can be done in anticipation to ward off the panic that will result?
2. Are there other lessons learned that should be added to the list?
  - There are a large number of lessons that revolve around risk that could be added. The number one lesson is to not make radical changes to the way you do business when placed under deadline pressures. Are there others that you can think of?

# Chapter 8: Government Case: Large Defense Project

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## On Organization

1. Has the organization retained its focus on business goals?
  - The goal of this project is to deliver, per contractual requirements, products that work on-time and within budget. The entire project is structured accordingly, with both customer and contractor organizations focused on this goal.
2. Is this the optimum organizational structure for the firm?
  - The structure is traditional. It holds the project manager responsible for results. There are no rewards for deviation. For example, building an evolutionary architecture that could be used by others is not in the cards, because the program cannot afford the extra time and effort involved in accommodating additional requirements.
3. Are there clear lines of communications and accountability?
  - There are clear lines of communications and accountability at the project level. How that translates down at the subcontractor, vendor, and supplier level is not apparent. Is this a risk and, if so, what can be done to fix the problem?
4. Is there sponsorship and leadership for change?
  - Change in projects like this is hard because the project leads have no incentives to alter the way they do business. What could be done to change this and convince conservative managers to try something different?

## On Process

1. Is there strong executive support for change management?
  - While the technology for this unmanned aerial vehicle (UAV) system might be new, both the management and development approaches being used are traditional. Because there is no incentive to change them, little executive support has been solicited. The incremental approach seems to satisfy these conservative managers, who rarely have any software background. However, there is enterprise support for process improvement that is in direct opposition to leaving things as they are. Definitions for common processes and tools are expected that project management feels are superfluous and that they have not funded. How do you convince project management to participate under such conditions?
2. Have those who are advocating for change addressed the process needs by developing a process framework for change?
  - The process framework developed relies on common software development processes. How do you handle this when there are so many players involved?

3. Have supply-chain management and licensing processes been adequately addressed as part of the change-management processes?
  - There is a framework for supply-chain management at the enterprise level. However, it does not address the myriad of organizations involved. How do you attack process improvement with so many organizational interfaces involved? Do you set requirements and pay suppliers to meet them? How much do you think they will charge (enough probably to have you waive the requirements)?

## On Product

1. Has the focus on product quality been lost as the organization increased its emphasis on change?
  - As usual, management attention is on productivity and not quality. How do you educate project management again so that they understand what is required to get a quality product out?
  - Do you think the software organization will ever see the budget cut again? If not, why not? Would the reason be that other groups, like systems engineering, get in trouble and spend the reserves first? Then, when the software organization needs their cash reserves, other groups have already spent it.
2. Are the product features being implemented still traceable to user needs and requirements?
  - With the myriad of organizations involved, success cannot be achieved without traceability from user needs to systems/software requirements to responsible organization to the product build in which it is being implemented. Why not?

## On People

1. Have change-management roles and responsibilities been defined, and are they understood by the workforce?
  - The project seems to have worked on resolving the management issues, but not those associated with change management. Many of the organizations do not have processes and tools that are compatible with yours. Transition to their use will take time, training, and talent, and nobody has planned for that to happen in a manner that has minimum impacts on delivery schedules and budget targets.
2. Does the organization making the changes hold people accountable for results?
  - By definition, it does. However, it will be difficult to pinpoint responsibilities without clear traceability to the responsible organization. This is especially true in a large project like this, where nonperformance at the subcontract or supplier level might be difficult to determine if reporting and metrics requirements are not implemented at the subsidiary levels.

## On Issues

1. List the issues, and rank them in priority order.
  - The issues being experienced are common to big projects like this one. Early on, staffing up to the levels desired with experienced people is always the number one problem. The result is that the project is always playing catch up because it got behind before it started. Later on, focus is the issue. Lack of focus occurs because of gold-plating and people making easy jobs difficult. The project could address these issues by developing both a risk list and an issues list. They could then devote resources to address issues as they occur and, hopefully, in anticipation of certain issues. You might discuss what the typical issues are at different stages of development and what you would do about them.
2. What criteria do you use to develop your rankings?
  - The criteria to use to rank the issues and risks revolve around cost and schedule impacts. Change-management risks should be addressed as one of these risks, especially when there are so many organizations involved and you are banking on common processes and tools to keep progress and performance on track.

## On Outcomes and Lessons Learned

1. Are the outcomes predictable?
  - This is a common story for large projects, which for the most part get into big trouble a little bit at a time. One could come up with the issues list without even looking at the project. You might discuss why this is so.
  - Because of the issues involved, it is important to note that this one case could have consumed at least half the book. Delivering quality software on schedule and within budget is a difficult task, especially when done under contract with executives in the loop who know little about what it truly takes to be successful.
2. How could you have influenced the outcomes to get more positive results?
  - On a large project like this, the easiest way to influence outcomes is to put in place systems and procedures that anticipate problems and work them out before they occur. Risk-management processes work along these lines.
3. Are there other lessons learned that should be added to the list?
  - I would add lessons that amplify the need to focus attention on subcontract, vendor, and supply-chain management practices, including traceability and the flow-down of contractual requirements for maintaining visibility, capturing metrics, and reporting progress.



- The need to strictly control interfaces at both the architectural and organizational levels using interface working groups and specifications is another lesson I would add.
- An emphasis on the use of proven risk-management practices and the use of “top 10” lists to prioritize attention are the final lesson I would add to my list.

## Chapter 9: Government Case: New Technology

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### On Organization

1. Has the organization retained its focus on business goals?
  - Based on the commercialization plan, the small business has reorganized. Do you believe that this new organization gives ample attention to business goals?
2. Is this the optimum organizational structure for the firm?
  - The organizational structure uses an advisory board and its board of directors to focus attention on commercialization. Discuss what the roles of each of these boards are and how they differ.
3. Are there clear lines of communications and accountability?
  - The departmentalization of the small business along product lines and internal services is very traditional. How do you go about getting these groups to talk to one another? Do you establish processes and working groups?
4. Is there sponsorship and leadership for change?
  - Processes for change management should be developed and inserted as the new structure is inserted organizationally. How should you approach development of these processes when you do not have a process group?

### On Process

1. Is there strong executive support for change management?
  - Executive management knows that change is needed to commercialize products. It is also apparent that they need help in understanding how to manage it. How would you go about helping them determine what to do? For example, would you solicit help from the many organizations set up to mentor small businesses along this line (including those available through the Small Business Administration and various state agencies)?

### On Product

1. Has the focus on product quality been lost as the organization increased its emphasis on change?
  - The firm formed a quality assurance organization and staffed it with six people in deference to this issue. What else could it do as part of its commercialization push?

2. Are Technology Readiness Levels (TRLs) an appropriate measure for determining the readiness of this technology for market?
  - As defined, organizations would adopt a technology like active defense only when it is fully proven. However, you probably are going to court early-adopter organizations as your initial market for products and services. The reason for this is that they will take the risk in technology to combat the threat. Therefore, TRLs might or might not be appropriate. If your discussions confirm that they are not, what measures would you replace them with?

## On People

1. Have change-management roles and responsibilities been defined, and are they understood by the workforce?
  - The players seem to be the people involved in the changeover to the new technology. Are there others who are impacted besides the commercial gaming firm's manager who should be consulted so that you can make the decision?

## On Issues

1. List the issues, and rank them in priority order.
  - As noted, the major issues revolve around the terms and conditions of partnering (and those involved in soliciting angel, venture capital, or IPO funding). Many entrepreneurs have to sign away rights in order to enter the market at the right time because they need capital and support to grow the business. How much would you be willing to give away to get to the evolving market before others do?
2. How would you determine how big the market was for your products and services?
  - While there are many generalized market surveys, those that target industries, companies, and consumers tend to be more accurate. However, conducting such a market survey takes specialized talent, time, contacts, and money. Do you think this would be a worthwhile investment?

## On Outcomes and Lessons Learned

1. Are the outcomes predictable?
  - Yes, because economic issues are always the most difficult to address. Having people take stances relative to who pays for what also creates a lot of bad will. Perhaps it would have been smarter to spell out the expectations relative to money right up front when the partner was engaged. But, in retrospect, it is too late for that now. What do you do to resolve the situation?

**2.** Are there other lessons learned that should be added to the list?

- Of course, you should spell out the financial commitments of all parties and draft a Memorandum of Agreement that spells out terms and conditions right up front.
- Sometimes, TRLs do not make sense. This is especially true for early adopters who are willing to take risk when the potential rewards are high, as they are in this situation.

## Chapter 10: Government Case: Maintenance Shop

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### On Organization

1. Has the organization retained its focus on business goals?
  - The question is whether maintenance is a business. If so, what business model do you adopt, especially when maintenance is done on a level-of-effort basis? How do you secure a profit, and how do you maximize it?
2. Is this the optimum organizational structure for the firm?
  - The center uses a classical matrix organization to take advantage of multiple demands on an engineering organization to keep it lean and mean. How do you optimize the use of the matrix when deliberate friction between projects and functional organizations is the daily norm?
3. Are there clear lines of communications and accountability?
  - The organizational structure seems simple, with clear lines of communications and accountability. When projects are small, how do you pay for all of the support services needed to keep the system operational (taxes, overhead, and other such items)?

### On Process

1. Is there strong executive support for change management?
  - Because leadership at the center would like to capture more big projects like this one, they have a vested interest in change management. Their primary interest is to ensure that changes enhance their ability to deliver what they promise. If they can do this, they will have a leg up on the competition.
2. Have those who are advocating for change addressed the process needs by developing a process framework for change?
  - Yes, they have adopted the CMMI framework and are using it to understand what they need to do. Unfortunately, this framework does not address all of the work that they need to perform as defined in Table 10-1. In response, management is supporting plowing new ground to enhance the framework accordingly.
3. Have supply-chain management and licensing processes been adequately addressed as part of the change-management processes?
  - While attention has not been placed on supply-chain management and licensing, it will have to be an integral part of the changes made. The reason for this is simple economics. The licenses being negotiated for this large project represent an opportunity for the center to help cut costs for small projects. By negotiating enterprisewide licenses, they will be able to take advantage of the economies of scale to benefit the organization.

## On Product

1. Has the focus on product quality been lost as the organization increased its emphasis on change?
  - The management of multiple releases in parallel (development, fielded, and so on) stresses the system when it comes to quality. Defects have to be recorded and traced to different versions to be prioritized and fixed.
2. Are the product features being implemented still traceable to user needs and requirements?
  - In a maintenance environment, a product without traceability to versions and good configuration management is one that is unmanageable. The maintenance team must be able to understand how to map changes to versions for the correct release to be distributed to the correct client. A discussion of good distribution-management practices might be something exciting for the class.

## On People

1. Have change-management roles and responsibilities been defined, and are they understood by the workforce?
  - The mix of skills and experience needed to do the job of maintenance is different than normally assumed and will be difficult to acquire. Training budgets will be needed no matter what option is selected to accommodate these needs. Depending on the option selected, orientation might be needed to solidify expectations and roles as well.
2. Are interdisciplinary teams built and used to facilitate change within the organization?
  - Because so many types of personnel are used to perform the job of maintenance, building interdisciplinary teams is a necessity. This effort might be further complicated by the fact that often actual users and field personnel are brought in to work in the System Integration Laboratory (SIL). These teams, if used as a change agent, can be a potent force in the organization because those who participate in them can bring core values back and facilitate change.

## On Issues

1. List the issues, and rank them in priority order.
  - The major issue here is staffing. Getting the numbers and skills will be difficult, as will convincing management that additional budgets are needed to cope with all of the tasks involved during maintenance. By necessity, budgets will include those for equipment, licenses, and facilities as well as labor. In instances involving COTS packages, such license costs can be expensive, as can the budgets needed to get real equipment delivered to the SIL so that it operates as close to a real system as possible.

## On Outcomes and Lessons Learned

1. Are the outcomes predictable?
  - The outcomes of this case are not predictable because of prevailing perceptions related to maintenance. Much of the work described in this case that maintenance shops have to perform are neither planned nor budgeted for. As a result, many maintenance shops operate on a best-effort basis and do whatever they can in priority order with the resources allocated.
2. How could you have influenced the outcomes to get more positive results?
  - To have more influence, the community needs to understand that there is much more to software maintenance than reported in the literature. For example, just the notion that experienced personnel, rather than junior personnel, are needed has to be ingrained in their minds. Probably the best thing that could be done is to use a Work Breakdown Structure (WBS). It points people to the work that must be funded in order to be successful.

# Chapter 11: Academic Case: Collaboration with Industry

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## On Organization

1. Has the organization retained its focus on business goals?
  - The organization is structured for growth once the business starts up and is successful. However, it is presently in the concept phase, and what you and your part-time employee have is a list of tasks that need to be completed for you to start your business.
2. Is this the optimum organizational structure for the firm?
  - By definition, the organization will change once you start up. You will take advantage of business opportunities as they present themselves and realign the organization accordingly to satisfy your obligations.
3. Are there clear lines of communications and accountability?
  - As you start up, lines of communications and accountability will be clear because the organization will be small. As the second level of management is introduced, the organization will need to be changed to ensure that such clearness is preserved. You need to recognize this and plan accordingly.
4. Is there sponsorship and leadership for change?
  - During startup, situations are fluid and opportunities for change abound. As organizations grow, concepts solidify, as does the resistance to change. To retain flexibility, change-management concepts need to be propagated. Enlightened senior management must provide sponsorship and leadership so that this flexibility is preserved as the organization grows and prospers.

## On Process

1. Is there strong executive support for change management?
  - Process is the least of your worries during startup. But as business solidifies and products start being produced, it needs to be addressed. Change-management concepts need to be integral to the engineering and technical processes that you adopt.
2. Have those who are advocating for change addressed the process needs by developing a process framework for change?
  - Remember that any process framework is better than none, because a framework provides you with a structure to work from.



## On Product

1. Has the focus on product quality been lost as the organization increased its emphasis on change?
  - Quality needs to be a consideration as products are generated by your teams. The use of college kids to do the work represents a unique opportunity because you can use quality as one of the factors that determines their grade. When you do this in courses, as in real life (personnel appraisals), people pay attention.

## On People

1. Have change-management roles and responsibilities been defined, and are they understood by the workforce?
  - When working with international student teams, it is very difficult to keep them focused on project goals rather than school goals. The biggest issue is language. What can you do to reduce the language barriers and motivate the workforce?
2. Does the organization making the changes hold people accountable for results?
  - Accountability is not the issue in this case—performance is. Expectations need to be clear from the start. Otherwise, getting students to produce results can be a challenge.

## On Issues

1. List the issues, and rank them in priority order.
  - Issues abound as your student staff and professor prepare their deliverables. However, as the list evidences, most of these are paper products and the code is late. In addition, there seems to be some conflict between the students' goals and yours.
  - Are you stretched too far? Have you assumed too much responsibility as you try to market your products and direct the student teams? There is a great deal to discuss here.
  - Have you protected your intellectual property in such a way that others cannot use it or claim rights to it without your permission? Would patenting the intellectual ideas be a wise move (even though it takes lots of time and money to accomplish this, which you do not presently have)? If not, how else would you go about making sure that you retained ownership?

## On Outcomes and Lessons Learned

1. Are the outcomes predictable?
  - The question is “Was using a student team a good idea, or would you have been better off hiring staff or perhaps a subcontractor to do the work?”

- Does adding staff to a late project make it later? This is a classic discussion topic.
- The intellectual property rights issues are major, and protection via a provisional patent might be a solution. It provides 12 months of protection for a reasonable price, and it can be used as a stopgap measure as you get other more important things done, like product development.

## Chapter 12: Making an Impact

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### Secrets of Success

1. Are there other secrets that should be added to the list?
  - The major secret that was not on the list is “Remember, quality is the discriminator.” Many people forget this and, as a result, suffer as sales drop.
2. If you could reprioritize the list, what would you change and why?
  - I like the priorities, but your students may have concerns with them. The discussion about priorities should be entertaining, especially when your students present their rationale for change.

### Lessons Learned Summary

1. Are there other major lessons learned from the cases?

There are many other lessons that could be added. The three that I like best are the following:

- Sometimes the status quo represents the best alternative because the pain/benefit ratio is too positive. Yes, the change is good. But to get there is hard, and there might be too many battles to fight and too much opposition.
  - The focus of your effort should be to put the change-management principles that we have discussed to work as you embrace new concepts and ideas. Such principles function as a framework you can harness independent of the size, environment, and complexity of the application.
  - Big changes rarely happen all at once. They typically occur incrementally as the change agent taps technology and tries to pick the low-hanging fruit.
2. If you could reprioritize the list, what would you change and why?
    - This is another good discussion question where the rationale for change will need to be presented to describe why the list should be changed.

### Ten Tools and Techniques to Rely On

1. Are there other tools that you think might be applicable? List them by phase.

Some follow:

- Delphi forums, which are used to reach consensus, are very useful tools—especially when dealing with diversified groups trying to rate and rank alternatives.

- Integrated Product Teams (IPTs) are multidisciplinary groups who take collective ownership for delivering a defined product or service.
- Students may suggest many others.

## What Seniors Want to See

1. Are there other things you need to do to gain senior management's trust?
  - Do not talk down to senior management. They will be insulted by such talk.
  - Show them the way. Identify the success path, and tell them why it is safe and sound.
  - Be available 24/7 to answer their questions, no matter how trivial. They will appreciate having you in their corner.
  - Keep them apprised of progress during both good times and bad times. When things go sour, they will remain in your corner because they will know the track record.
2. If a genie granted you three wishes from senior management, what would you ask for?
  - Two things and three more wishes. This should be one of the most interesting areas of discussion, especially when you ask your students to explain why they selected their three wishes.

## What Workers Want to Hear

1. Are there other strategies you would embrace to get worker support?
  - Understand that what motivates workers might be different than what gets management excited. It has been shown that interesting work and the ability to excel gets workers more hyped than potential salary raises and promotions.
2. If a genie granted you three wishes relative to worker support, what would you ask for?
  - This question, again, will provide interesting dialog, especially when students are asked to explain why they selected these three additional wishes.