Accelerating Process Improvement Using Agile Techniques

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In today's fast-paced, cost-conscious world, it is critical for companies to keep up with the Joneses while continuing to keep costs reasonable. The cost of process improvement efforts has proven hefty. Many companies have abandoned these efforts simply because they cannot afford the associated costs. By speeding up process improvement, companies get their bang for the buck.

Mark slugs down one more beer and figures it is about time to go home. This afterwork party is getting boring. As he is getting ready to leave, Mark sees a coworker who he has not seen in a long time.

"Hey, Joe!" Mark yells across the crowded room.

"Mark, my man, long time," Joe answers as he comes over to sit by Mark at the bar.

"How's life treatin' ya?" Mark asks, wondering why Joe, who is usually such a fun-loving guy, seems so miserable.

"Oh, okay I guess," Joe says, unconvincingly, ordering another beer for himself and Mark.

"So, how's that high profile project you were telling me about going?" Mark asks.

"Hey, between you, me, and the bartender, I've about had it!" Joe exclaims.

"So, what happened?" Mark asks. "You said this was the opportunity of a lifetime last time we talked. The promotion to software project lead is what you've been working for since college."

"This has definitely turned out to be the project from hell! I thought the last project was bad but this one beats them all!" Joe complains. "We're always behind schedule, and the costs are skyrocketing! We had to add three more engineers and you know what that's like, between training them and trying to get the real work done, we end up even farther behind."

Table 1: *Key Success Criteria in Accelerating Process Improvement*

Key Success Criteria
Executive Management Commitment
Mid-Level Management Commitment
Organizational Adaptability ->Flexible
Project Management Style ->Proactive
Training Style ->Proactive
Communications Style ->Open and Non-Inhibitive
Delegation of Authority
Process Improvement Model Familiarity
Process Acceptance Factor ->Positive

"Yeah, I know what you mean," Mark says, empathizing. "The project I'm on makes it hard to get out of bed in the morning, too."

"It just keeps going on and on with this company, all talk and no action," says Joe. "They tell us that they're working on it but nothing ever changes, same old thing every time. Get a new project, make unreasonable promises, and who suffers? We do."

"Yeah, I know what you mean!" Mark says.

"Well, I'm not going to take it any more; my resume was out the door a week ago. I'm just fed up now. They can't all be this bad," Joe says hesitantly, and adds, "Can they?"

"I hope not. I may be right behind you, Joe. Put in a good word for me when you find something," Mark says commiserating as he orders another beer to wash down the gloom that is now starting to overcome him, too.

Why Accelerate Process Improvement?

This scenario is played out in organizations all over the country every day. Good people are lost, money is lost, reputations are lost, and, ultimately, clients are lost because of immature organizations.

The bottom line is this: Companies cannot afford to wait while bureaucracy plays itself out. The consequences can be overwhelming with projects over cost and over schedule, extensive overtime, confusion, loss of staff, misdirection, distrust, and frustration. Nobody likes to be caught with their pants down, which is typical of immature organizations. By accelerating the process improvement effort and getting processes in place quickly using agile techniques, an organization can concentrate on improving their processes over time and still remain competitive in an agile business environment.

How to Accelerate Process Improvement

There are many models and methodologies available for improving an organization's failure or success quota such as the ISO 9000 series, Software Process Improvement and Capability dEtermination, Total Quality Management, Software Process Improvement in Regions of Europe, the Project Management Institute's Project Management Body of Knowledge, and Six Sigma to name just a few.

To date, the Software Engineering Institute's (SEI[SM]) Capability Maturity Model® (CMM®), including the CMM for Software (SW-CMM) and the CMM Integration[SM] (CMMI®), have proven to be the most successful at maturing organizations. It all depends upon your ultimate goals with the process improvement effort being undertaken.

Regardless of the model or methodology selected, by using the keep-it-short and-simple (KISS) method, many basic elements can be put in place quickly to kick things off, thus building a foundation for continued improvement. Sometimes, we tend to concentrate on the gory details and forget the big picture.

Key Success Criteria

The SEI recommends 18 to 24 months per level for the CMM. The basic KISS philosophy and use of many of the techniques discussed in this article were responsible for bringing an organization to CMM Level 3 in just over one year. The rest of the techniques are based on the lessons learned from this and other process improvement efforts.

There are several key success criteria that organizations should meet prior to attempting to accelerate a process improvement effort. Table 1 provides a list of important key success criteria.

The SEI developed the Initiating, Diagnosing, Establishing, Acting and Learning (IDEAL[SM]) process improvement methodology in the mid-90s to guide process improvement adopters. The

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IDEAL model is based on the Deming Cycle/Shewhart Cycle, Plan-Do-Check-Act, which provides a mechanism for perpetual change. The Accelerating Process Improvement Methodology (APIM) uses these models as a basis.

For the APIM, time is the key word. The very successful agile programming methodology was also used as a basis for the APIM. Indeed, process improvement can be quite complex, just as software development is. However, the key to process improvement is improving the way you do business, and for the majority of businesses faster, better, and cheaper is the mantra of the day. Figure 1 illustrates the APIM.

The APIM has three phases: Pre-Maturity, Maturity, and Post-Maturity. Each phase consists of various steps required to develop an organization's maturity. As illustrated in Figure 1, the Maturity Phase is iterative. It is repeated until an organization is ready for a formal assessment.

This methodology takes an agile approach with simplicity and common sense as the magic words. Many times organizations tend to over-process with multiple forms, plans, and procedures that end up being meaningless. As is usually the case, the devil is in the details.

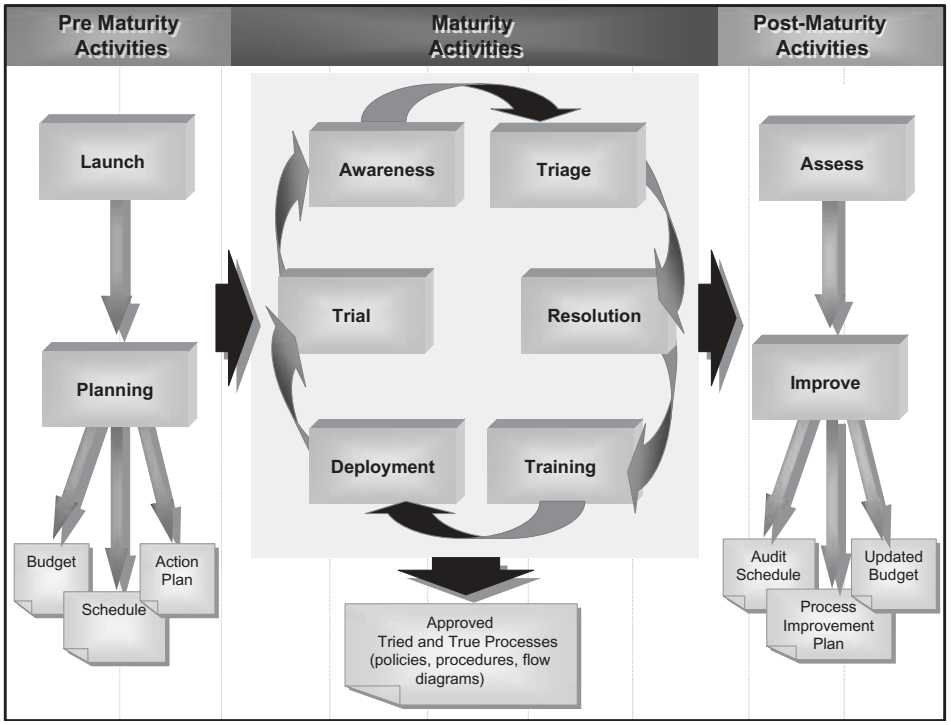

Figure 1: *Accelerating Process Improvement Methodology (APIM)*

Pre-Maturity Phase: Step 1-Launch

The launch step is key to having the appropriate resources and budget for execution of the APIM. This is where you get buy-in from executive management. Without executive buy-in, it will be virtually impossible to move ahead in any process improvement effort; however, for an accelerated process improvement effort it becomes even more critical to success. Each organization has its own method of authorizing tasks, but you should get official executive approvals and task authorizations before proceeding.

Initial resources and appointments to the process team will be an important activity during launch. Based on previous process improvement efforts, it is recommended that the core process team be kept fairly small depending upon the size of the organization and have enough hours assigned to the team to get the real work accomplished. Too many people can cause bottlenecks that prevent, or slow, real accomplishment. On the flip side, too few people, or too few hours for the people assigned, allows no room for accomplishing tasks. Additionally, assigning the wrong people with a negative attitude to the group can sabotage the effort.

The key will be to find the appropriate balance for the organization. It requires closely monitoring the group during start-up from the honeymoon stage (this is the time that people are most enthused) into the early start-up stages. It may take some trial and error to form the right group of people to accomplish the tasks required to accelerate process improvement.

An executive steering committee should be formed during launch. This committee can be very effective in providing needed resources and resolving issues throughout the process. Always remember to remain agile; do not let the bureaucracy typically associated with numerous committees bog you down. When you start putting in frequent, long, drawn-out review cycles and approvals, you stop being agile.

In order to make a difference, the process team should be armed with the authority to make decisions and changes needed to meet the process improvement goals. Arming the process team, or at least the lead, with authority, levels the playing field for them by providing an equal voice with project managers. By leveling the playing field within the organization, the process team will be better able to make reasonable changes. Even though there will, in all probability, be mistakes, the organization must be prepared to roll with the punches to ease a quick recovery.

The final and very important task during the launch step is the initial kickoff meetings. There should be at least two kickoff meetings for the organization during launch:

1. The initial kickoff meeting should be with the executive staff, as previously discussed. This may have already been accomplished at the very beginning of the launch step or even prior to launch.
2. Once the initial resources and appointments have been determined, a process team meeting will be the first activity for bringing the process team together and getting a feel for how they will work together. Remember, this is still the honeymoon stage, so it will be hard to really tell how the group will form until some time passes.

Pre-Maturity Phase: Step 2-Planning

There are many reasons why projects fail, but survey after survey has found that one of the top reasons for failure is lack of planning. Conversely, studies have found that a major reason for success is proper planning. Upfront planning is very important but, as with the very successful agile programming methodology, planning should remain as painless as possible and iterative.

A forward-looking philosophy should be employed to ensure that you are prepared for tasking but concurrently ensure enough flexibility to accommodate changing task priorities. In essence, the upfront planning should provide the basic strategy by which a process improvement effort operates. An action plan should be developed that includes the following:

- Process improvement goals.
- Major milestones and associated tasks.
- Measures to indicate status and effectiveness (remember KISS).
- Resources and appointments to the team.

- Team responsibilities.
- Initial risks and mitigation.
- Budget (this will depend upon how an organization handles budgeting).
- Completion criteria.

For each task, the responsible team member should develop a short and simple implementation/action plan. This will be discussed more fully in later phases. The major milestones should be defined in a master schedule, which is critical to the success of any project. The master schedule should always be maintained to include all current tasks, upcoming tasks, and potential tasks. Each current and upcoming task should be tracked to resolution to ensure appropriate resources are available to accomplish essential tasks as assigned. The master schedule should be developed and maintained by the process team to ensure soundness of the timelines. This will be a very important tool for success.

During the planning step, the following two additional kickoff meetings should be conducted for the organization:

1. A special kickoff meeting should be accomplished with the mid-level management staff. This is where a mid-level management commitment is received, which is as important to the success of the effort as executive management commitment. The mid-level management will ensure that things are done a certain way such as using the processes developed by the process team.
2. A kickoff meeting for the entire organization's staff will provide the first opportunity to advertise the process improvement effort. Advertising the effort will be important to getting the entire organization on board with processes and the process improvement effort. Further advertising should be done throughout the process. Remember, the ultimate goal of process improvement is to change the way the organization accomplishes its work. If the staff doing the work is not on board and aware of the effort, the changes cannot be accomplished. Some suggestions include regular e-mails, newsletters, posters, flyers, presentations, and announcements at other meetings by executive management.

Maturity Phase: Step 1-Awareness

A mini-assessment will determine where an organization is, and where they need to go. The focus is on finding and identifying the weak areas that need to be corrected or improved to meet best practices or the organization's process goals. The initial mini-assessment will set the baseline for progress mini-assessments, which should be accomplished for each iteration of the maturity phase as illustrated in the APIM diagram.

Various mini-assessment methods can be used but any mini-assessment should have a minimal impact to the organization's staff. At minimum, it should consist of a records analysis as well as interviews with the process users. The length, size, and scope of the mini-assessment will be dependent upon the assessor's knowledge of the organization and the process goals. For example if CMMI is selected, the assessor should have a good working knowledge of that model. A mix of internal and external staff, either within or outside the company, can be very beneficial to gain both organizational knowledge and model knowledge.

The mini-assessment results should be analyzed to determine the weak areas along with the level of weakness and an initial estimate of what it will take to strengthen the area. The final analysis will determine what actions need to be taken to meet the organization's process goals. The actions can be viewed much like the user stories in the agile programming methodology. The initial mini-assessment results should become the baseline for use in later iterations.

The baseline results should be maintained through use of a tool to depict the status of each project and the organization. One successful method is through maintenance of stoplight-type charts or other types of tables that indicate each project and the organization's status. These should be updated following each progress mini-assessment and regularly reported to the executive steering committee.

Maturity Phase: Step 2-Triage

Triage comes from an old French word meaning sorting or sifting. It has been used to describe the treatment of patients, especially battle and disaster victims, according to a system of priorities designed to maximize the number of survivors. For patients, the following three categories have been defined: 1) those who will not survive even with treatment; 2) those who will survive without treatment; and 3) those whose survival depends on treatment. By using triage, the treatment of patients requiring help is not delayed by useless or unnecessary treatment of those in the other groups. Triage originated in military medicine when limited resources faced many wounded soldiers and time was critical. Hence, triage decisions are made after relatively quick examination; patients in lower-priority groups are reexamined periodically.

This same triage or sorting method can be used to accelerate process improvement efforts. The prioritization categories would be a bit different with consideration for the level of weakness and the effort required to strengthen it. A second consideration is the needed actions of most value to the project or the organization. The key selection criteria should be based on three goals: business goals, project goals, and process goals.

Whatever prioritization criteria are used, this should be done swiftly in order to get the organization where it needs to go as quickly as possible. Based on his former Army experience, Christopher P. Higgins, Bank of America national manager currency Services, said, "Make a decision! Make a decision! People are dying all around you!"

Agile programming uses index cards to depict their user stories. This method could also be used effectively for process improvement with the actions needed as the user stories. Another method just as successful is to maintain actions needed in written form such as tables. For each iteration of the maturity phase, the index cards or tables must be updated to reflect the current actions needed.

Maturity Phase: Step 3-Resolution

Based on prioritization, actions are selected and assigned to process team members for resolution. For each action, the responsible team member should develop a short and simple implementation/action plan. The size and scope of this plan depends on the size and scope of the assigned task, but it should be kept minimal with the key information needed to accomplish the task. The following is recommended for inclusion: problem definition/objectives/purpose, team members, piloting strategy, desired results, issues and risks, timeline and high level tasks, and deliverables. A sample of an agile action plan can be found with the online version of this article at <www.stsc.hill.af.mil/crosstalk/2004/03/0403jacobs.html>.

During resolution, the process should be developed that may include process flows, policies, procedures, forms, and templates. The key again is simplicity: KISS. As in agile programming, do the simplest thing that will work. If previously developed complex processes are used, you should use a technique called refactoring in programming that means making the code clearer, cleaner, simpler, and elegant. This does not mean changing the functionality or rewriting processes but simplifying them for easier use.

A quick peer review method should be used to finalize processes for piloting as well as an approval process in order to ensure the integrity of the processes. As with the rest of this methodology, the key is agility and keeping it simple. Avoid bureaucracy unless highly warranted; it is time consuming.

Maturity Phase: Step 4 - Training

Training can play a pivotal role in the acceptance or rejection of a developed process. Special care should be taken with training to get buy-in from the process users. This duration should be used to tailor the process to meet any specific user needs as well as train the user on the process.

Maturity Phase: Step 5- Deployment

Processes should be piloted on a project or within the organization prior to being added to the organization's process repository. It is important to ensure that the process will work in a real situation instead of just in theory.

The process team should act as a mentor/coach for the project when piloting processes. Frequent checkups should be done to ensure that it is being used as developed and to ensure a complete understanding of each step, template, deliverable, etc.

Maturity Phase: Step 6 - Trial

Once the process has been piloted, the process team should assess the effectiveness of the processes developed for the selected action and either approve or reject them. Depending upon the severity of the findings, they may be immediately improved and approved, or improved and re-piloted during the next iteration. As always, collect lessons learned for making later iterations easier, better, and even more agile.

Post-Maturity Phase: Step 1 - Assess

The final phase is the Post-Maturity Phase that starts with the formal assessment. A formal assessment should be accomplished when the progress mini-assessment indicates readiness. The method of assessment will depend upon the process improvement model or methodology selected, but it will be key to identifying strengths and weaknesses from an outside source. Some formal assessments use organizational staff and some use staff from outside the organization or company.

Post-Maturity Phase: Step 2-Improve

It is important to provide continuous improvement to an organization. Organizations change, staff changes, business goals change; many changes take place in organizations, sometimes very quickly, and processes must continuously keep up with these changes. The accelerated process improvement effort will put the initial processes needed in place as a foundation for further improvement.

In order to continue being agile and keep costs at a minimum, the accelerated process improvement method can continue to be used. Since needed processes will already be in place, it may require tailoring to meet future process needs as opposed to initial process needs. The following are some of the things that should be considered for the improvement effort:

- Improvement measures.
- Audit plans.
- Audit reports.
- Periodic progress assessments.
- Updated risks.
- Updated budget.
- Updated action plan.
- Task-completion criteria.

Phase	Step	Objectives
Pre-Maturity	Launch	• Executive Approvals • Task Authorization • Executive Steering Committee • Initial Resources/ Appointments • Kickoff Meeting(s)
Pre-Maturity	Planning	• Develop Brief Action Plan ✓ Goals ✓ Milestones ✓ Measures ✓ Resources ✓ Risks ✓ Responsibilities ✓ Budget ✓ Completion Criteria
Maturity	Awareness	• Mini-assessment to identify strengths and weaknesses • Maturity level measurement • Analyze current situation
Maturity	Triage	• Determine strategy and actions • Analyze return on investment for *each* action • Select actions using a triage approach (speed is the key here) based on importance to: ✓ business goals ✓ project goals ✓ process goals • Prioritize selected actions
Maturity	Resolution	• Select project(s) for piloting initial processes • Develop processes (remember KISS): ✓ process flows ✓ policies ✓ procedures ✓ forms ✓ templates • Process Reviews and Approvals
Maturity	Training	• Train pilot process users • Tailor, as needed
Maturity	Deployment	• Pilot processes to selected project • Mentor pilot project(s)
Maturity	Trial	• Assess effectiveness • Improve/approve • Collect and analyze lessons learned
Post-Maturity	Assess	• Determine maturity level • Identify strengths and weakness for future improvement
Post-Maturity	Improve	• Improvement Measures • Audit Plans • Audit Reports • Periodic Progress Assessments • Update Risks • Update Budget • Update Action Plan • Task Completion Criteria

Table 2: *Accelerating Process Improvement Steps Overview*

APIM Checklist

Table 2 provides a quick checklist/overview for each step in APIM.

APIM Truths

The SEI has long recommended allotting 18 to 24 months per CMM level. It found that the average is two years to get to SW-CMM Level 2. Watts Humphrey, founder of the Software Process Program at the SEI, recommends one to three years per level. Each organization must weigh the importance of the advantages and disadvantages based on their unique environment to determine whether to take it slow and easy or accelerate process improvement.

Table 3 (see page 8) compares some typical advantages and disadvantages of accelerating processes to taking it slow and easy.

Bottom Line

There are many lessons learned from both successful and unsuccessful process improvement efforts. The Internet is full of hard-learned lessons and provides a great tool for levying others' lessons learned. There are also many lessons learned from successful accelerated process improvement efforts. Use the tools and techniques developed and shared by others to help make your process improvement effort successful as well as the difficult lessons learned to help avoid making the same mistakes.

COMING EVENTS

March 29-April 1
Defense Technical Information Center Annual Meeting and Training Conference
Alexandria, VA
www.dtic.mil/dtic/annualconf

March 30-31
3rd Annual Southeastern Software Engineering Conference
Huntsville, AL
www.ndia-tvc.org/SESEC

April 19-22
2004 Systems and Software Technology Conference
Salt Lake City, UT
www.stc-online.org

May 17-21
STAREAST
Orlando, FL
www.sqe.com/stareast/

May 23-28
26th International Conference on Software Engineering
Edinburgh, Scotland
www.jupiterevents.com

June 23-26
Agile Development Conference 2004
Salt Lake City, UT
www.agiledevelopment conference.com

September 27-29
4th ACM International Conference on Embedded Software
Pisa, Italy
www.emsoft.org

November 15-19
STARWEST
Anaheim, CA
www.sqe.com/starwest/

Accelerating	Slow and Easy
Quicker return on investment	Institutionalization more likely
Early success fuels improvements later	More time for improvement successes
Early failures jeopardize later efforts	Easier recovery from failures
Tendency to keep things simpler	Tendency to create bureaucracy
Less time	More time
Processes in place quicker	Processes more staggered
Requires research to levy lessons learned from other organizations	More time to learn from lessons and collect historical data
Process improvement staff needs to be both process savvy and have an agile temperament	Time to learn process improvement how-tos

Table 3: *Accelerating Process Improvement Advantages and Disadvantages*

Keeping costs reasonable and time optimal is the key advantage of APIM. This method has been proven to keep process improvement costs lower and time minimal. However, it is key to remember that you should have a small, agile process team and there should be very little project impact due to the process improvement effort. The only impact to projects should be in improving the way the projects operate. Otherwise, the cost savings will be minimal if seen at all. The bottom line is: Do not sacrifice productivity to meet process improvement goals. This will counteract any of the advantages achieved by using the APIM.

Finally, always consider, "What is the bang for the buck?" If the return from each step, form, or plan, is not worth the time it takes to do it, then it should probably not be accomplished. Do not let bureaucracy stop you from achieving your ultimate process improvement goal: Mature processes for a smoother, more effective working environment.

Whatever you do, always remain agile!◆

Additional Reading

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About the Author

Deb Jacobs is process improvement manager and principal engineer at Software Engineering Services. She has over 25 years experience in system/software engineering, project management, and process improvement, including helping organizations be more successful in development and management. Her notable successes include leading a successful Capability Maturity Model® (CMM®) Level 3 effort in one year, organizing struggling projects, and mentoring new managers. She is former SPINOUT newsletter editor/ originator, former CERT® [Computer Emergency Response Team] Conference chairperson, InfoTech deputy Software Tracks chair, and a Software Engineering Institute CMM Integration℠ contributor. Jacobs has a Bachelor of Science in computer science.

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Sample
Agile Action Plan

Monitoring and Control (Organizational) Action Plan Program Management Office Establishment

Problem Definition/Objectives/Purpose:
A consistent, repeatable method is needed for monitoring projects. The purpose of this task is to develop the processes, templates, and guidelines for management of all projects.

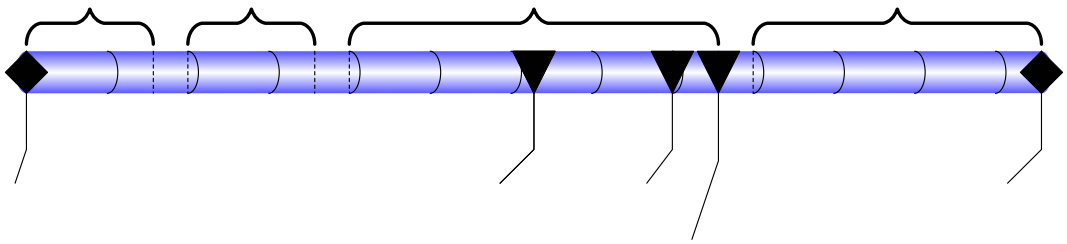
Team Members:
Rod Simpson
Jane Smith
John Jackman

Piloting Strategy:
Piloting will be accomplished by using the selected projects to accomplish the processes developed and by improving with lessons learned as we go along. The PLID project has been selected to try the process out due to their current maturity level and availability. They will try it once or twice, and then the rest of the selected piloting projects will attempt to follow the process. The processes will be tweaked along the way to make it work best for each project as well as give the management team the information they need to monitor projects.

Desired Results:
The key expected result is development of a Program Management Office with processes and templates that allow executive management to monitor projects. It also provides an opportunity to manage issues before they become issues for the customer.

Issues and Risks:
Executive Management buy-in.
Executive Management using process for statusing projects.

Timeline/Actions:



Deliverables:
Flow Charts (High Level and Detailed)
Processes
Templates
Specifics to be Determined