UT Southwestern
Medical Center

The University of Texas Southwestern Medical Center
Project Management / System Acquisition Methodology
Audit
Internal Audit Report 15:27

October 9, 2015

Table of Contents

Executive Summary

Background

Within the Information Resources (IR) division of The University of Texas Southwestern Medical Center (UTSW), five separate departments principally manage Information Technology (IT) capital projects (i.e., projects with a total cost greater than $25,000):

- Academic Information Systems (AIS)
- Business Administrative Systems (BAS)
- Health Systems Information Resources (HSIR)
- Systems and Operations (SysOps), and
- Infrastructure Services (IS).

SysOps and IS often play a supporting role in implementing projects managed by the other three departments, but SysOps also manages their own projects involving the infrastructure of servers and networks. Frequently, IT capital projects are implemented with processing steps occurring from one IR department to another IT department until completion. For example, a basic sciences project may start with an infrastructure build-out but also require new users involving Systems and Operations, as well as a new application involving Academic Information Systems. UTSW originates IT projects within its separate IR departments as needed, unlike large organizations that commonly have a centralized Project Management Office (PMO).

The purpose of this audit was to evaluate the internal controls and the efficiency and effectiveness of the implementation of medium to large-scale capital projects as they were implemented in one department, or as they progressed across departments in this distributed IR environment. Current IT Project Management "Best Practices" were used as a benchmark comparison.

Scope and Objectives

This audit is part of the Fiscal Year 2015 Institutional Internal Audit Plan. The scope period was FY 2014 to the present (September 1, 2013 to present).

The overall audit objective was to determine the following:
- Adequate project management controls were in place during an IT system acquisition, from beginning through implementation.
- Improvement opportunities that may exist when compared with the IR Maturity Management Model.

The Capability Maturity Model Integration (CMMI) commonly used by many IR departments, is registered in the U.S. Patent and Trademark Office and marketed by Carnegie Mellon University.

The following risk areas were considered in this review: project feasibility; change management; scoping methodology; stakeholder communication; project integration; testing; and user acceptance.

Executive Summary

Conclusion

We reviewed each of the five IR departments listed above. The departments differ as to the clients they serve, the complexity of the systems which they support, the interdependencies of systems that may be supported by others, and in terms of the number of dedicated resources needed to provide support for project implementation from beginning to end. Previously, the IR departments have recognized and identified opportunities for creating more common practices and standards that would be followed across all of the groups. While some IR departments may have adopted and improved processes in recent years, there are still opportunities for other IR departments to adopt the practices or enhance the processes currently followed. The opportunities mainly relate to meeting the needs of management in implementing systems that are designed and function effectively as planned, and are implemented on time and within budget requirements.

Overall, we observed a positive culture in which talented IT professionals are dedicated to building a robust computing infrastructure. This focused staff is working daily to integrate and enhance an environment that includes: myriad computing equipment; feature-rich cellular devices; and high speed, wireless, video, software, and telephony technologies; all contained in a secure environment. Many impressive project strengths were identified, including:

- Experienced, conscientious, IT staff who take their roles seriously as they endeavor to support the IT needs of UTSW's hospitals, clinics, students, research programs, internal administrative departments, and external collaborators.
- A well-established centralized project management office within HSIR, with robust project management procedures.
- Project Management Professional (PMP) certified staff embedded in four of the five IR departments reviewed, including a majority of the staff in the HSIR Project Management Office.
- Successful completion of several major projects including the Clements University Hospital (delivered on time and under budget), the Epic electronic medical record system upgrade, and Medical School Curricular Reform.

There are opportunities for IT maturity growth in project management in four major areas: an increase in communication quality and thoroughness among the departments and with customers; more robust project documentation that maps project process, progress, and budget-to-actual cost; documented system interdependencies; and, an enhanced customer service orientation. Four specific findings are summarized below.

Included in the table below is a summary of the observations noted, along with the respective disposition of these observations within the UTSW internal audit risk definition and classification process. See Appendix A for Risk Rating Classification and Definitions.

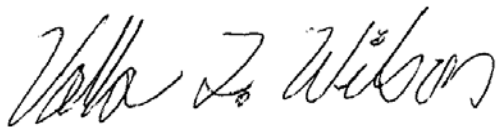| High (0)	Medium/High (0)	Medium (4)	Low (0)	Total (4)

Executive Summary

There were four unique medium risk issues identified across the five IR departments. Risks for some areas may not have been as high as risks for other areas.

- **Design and implement a fully mapped and disciplined project management process across all IR departments** – Essential components expected in a mature IT project management process were missing in some IR departments.

- **Build a consolidated catalog of system dependencies / interfaces maintained within each IR department -** A catalog of system dependencies / interfaces is not in place in some IR departments.

- **Improve communication among IR departments –** Improvement in communication between IR departments is needed for increased efficiency, predictability, and avoidance of surprises and rework.

- **Develop a more positive and consistent customer service orientation across IR –** The perception of IR as a service organization could be improved with an enhanced customer orientation.

The IR Chief Information Officer and his direct reports will address these four issues by first assessing the documentation, communication, and service orientation gaps in project management as identified in this review. Following this assessment, a strategy and tactical Pilot Project plan will be formulated, including FY2016 budget resource consideration. Internal Audit coordinated with IR leadership in developing management action plans. Action plan timelines are in phases with final completion by the end of March 2016. These responses, along with additional details for the observations, are listed in the Detailed Observations and Action Plans Matrix section of this report.

We would like to take the opportunity to thank the departments and individuals included in this audit for the courtesies extended to us and for their cooperation and patience during our review.

Sincerely,

Valla Wilson, Assistant Vice President for Internal Audit

Audit Team:
Michael Corse, Student Intern
John Maurer, Senior IT Auditor

Executive Summary

Jeffrey Kromer, Director IT and Specialty Audit Services
Valla Wilson, Assistant Vice President for Internal Audit

Cc: Arnim Dontes, Executive Vice President for Business Affairs
        Kirk Kirksey, Vice President and Chief Information Officer
        Mark Rauschuber, Associate Vice President and Chief Information Officer
        Dipti Ranganathan, Associate Vice President for Information Resources
        Ed Ames, Assistant Vice President for Systems and Operations
        Victoria Stasinskaya, Assistant Vice President for Business Administrative Systems
        Joshua Spencer, Assistant Vice President and Chief Information Security Officer
        Darnell Walker, Assistant Vice President of Infrastructure Services
        Stuart Lamm, Director of Unified Communications
        Todd Epperson, Assistant Director
        Melody Bell, Senior Manager
        Brian Curnutt, Senior Manager
        George Hord, Senior Manager
        Gabe Gabriel, Project Manager

Detailed Observations and Action Plans Matrix

Observation	Recommendation	Management Response
Risk Rating: Medium 🟡 1. **Design and implement a fully mapped and disciplined Project Management Process, with project documentation, from Initiation phase to Post-Implementation phase across all IR departments.** The following are essential components expected in a mature IT project management process, but were missing in four of the five IR departments: • A complete, documented project management process map • A catalog of system dependencies / interfaces • What would be considered a robust, complete project documentation portfolio As a result, wasted time, wasted resources, cost over-runs, user disappointment, implementation delays, and poor quality control could occur. In addition, the following two documents were not found for all ten projects reviewed: • A budget-to-actual project cost • A time-line indicating whether the project was completed as scheduled, or delayed Without these two documents an accurate measure of project success may not be feasible.	1. Establish a Pilot Project team to develop a consistent IR Project Management methodology and documentation tool. When the Pilot Project is successful, roll out the new Project Management Documentation Methodology across all IR. 2. Ensure there is a dedicated PMP-certified professional in each of the five IR departments: AIS, BAS, HSIR, SysOps, and IS (or, lacking certification, highly conversant with PMP methodology). The role of the PMP is to understand his/her department's operations but, more importantly, they frequently interface collaboratively with each other. They speak the same project management language, coordinate time-lines, schedules, dependencies, process improvement, and foster project management discipline within their department and across IR. 3. Establish a centralized SharePoint site for all IR departments to store and to access Project documentation in a commonly agreed organizational structure.	**Management Action Plans:** 1. We agree and a Pilot Project team will be put in place to develop a new Project Management methodology and documentation for all IR. To develop a broad, new, all-encompassing methodology tool, three phases will be appropriate: a. Study b. Planning c. Implementation The Pilot Project team will choose a group of capital projects based on a cluster of risk factors, including cost, size, and inter-dependencies. The strengths of the PlanView project management tool should be included in this new methodology. The goal of the Pilot is development of a consistent, fully mapped Project management tool across all IR, with a robust portfolio of documentation consistent with Appendix B, p. 14, below. 2. Management agrees. If not already on the respective department staff, a PMP-certified professional, or otherwise qualified individual, will be added to each of the five IR departments: AIS, BAS, HSIR, SysOps, and IS.

Detailed Observations and Action Plans Matrix

Observation	Recommendation	Management Response
Other project management opportunities are: • Risk management documents are not always completed, which could result in risks being overlooked and system dependencies and interfaces not adequately identified. (The Project Risk Assessment is essential because it documents and ranks the risks associated with the project, which could prevent or hinder achieving the project goals and objectives.) • Project milestones are not always identified, which could result in inaccurate progress completion estimates, miscommunication to business owner(s) and expectations not being met. • "Lessons Learned" are not always documented, therefore the potential for increasing project discipline can be lost, and similar mistakes could recur in future projects. Lessons Learned is a normal practice in assessing the things that went wrong or could have gone better to improve the overall outcome of the project. • There is no formal filing scheme for storage of critical documentation maintained throughout the project. Project documentation is frequently stored in various places under various filing schemes, resulting in wasted time and effort, staff frustration and, sometimes, duplicated documents in trying to locate the project documentation.		3. A centralized SharePoint site will be created for all IR departments to store and to access Project documentation. **Action Plan Owners:** Vice President and Chief Information Officer **Target Completion Dates:** 1a. Study by November 30, 2015 1b. Planning by January 31, 2016 1c. Implementation of pilot by March 31, 2016. 2. November 30, 2015 3. December 31, 2015

Detailed Observations and Action Plans Matrix

Observation	Recommendation	Management Response
Risk Rating: Medium 🟡 **2. Build a consolidated catalog of system dependencies and interfaces maintained within each IR department.** An inventory and documentation of system dependencies and interfaces was not in place for seven out of ten projects. Typically at UTSW, a new system impacts existing systems, modules, and/or databases. Multiple dependencies and challenges to interoperability confront the Project Manager and project team of every new system. Lack of clear understanding of linking interoperability between systems can result in program errors, system failure, project delay, wasted time, and likely negative effect upon other systems if put into production without knowledge of its impact.	1. Leveraging the best practices already in place among the IR departments, develop a documented live catalog of dependencies and interfaces in a Pilot project of new capital IT projects. Using a risk-based approach, the new IT projects for this Pilot should be selected based on highest risk, with at least one from each of the five IR departments. The goal of the Pilot project is to develop a disciplined and consistent best practices project methodology for capturing dependencies and interfaces for all new IT systems. This catalog should be reviewed at the beginning of each new project and included in all change management meetings. Consider the use of a SharePoint site or other method to ensure the live catalog is easily accessible by all appropriate IR staff.	**Management Action Plans:** 1. Management agrees. One catalog of dependencies/interfaces will be created and accessible across all IR. This document will be organic in that one person from each of the five departments will maintain and update it as changes occur. An overall assessment and strategy will be developed within 60 days. 2. A suitable communication delivery tool, including possibly a SharePoint site, will be identified and implemented. 3. Dependencies and Interfaces will be identified and cataloged from each of the five IR departments. The catalog will be updated as new dependencies and interfaces are added and changed. **Action Plan Owners:** Vice President and Chief Information Officer **Target Completion Dates:** 1. Assessment and strategy by November 30, 2015. 2. An appropriate delivery tool will be identified and in place by December 31, 2015. 3. Dependencies and Interfaces will be cataloged from the Pilot project by March 31, 2016.

Detailed Observations and Action Plans Matrix

Observation	Recommendation	Management Response
Risk Rating: Medium 🟡 **3. Redesign and improve project methodology to help enforce communication among IR departments.** Infrequent and inconsistently documented inter-departmental communication often led to the frustrations for business owners and project delays. For example: • Because UTSW IR departments tend to operate in silos, communication about projects would often come as a surprise to the receiver. • Many IR project managers do not know who to go to when a project goes beyond their department's boundary, due to an ambiguity regarding department responsibilities and who is accountable. Intra-departmental communication also needs improvement. • Lack of clear communication about job role(s) within large departments can cause increased frustration and poor morale among project teams. The goals of a consistent project methodology include increased communication and efficiency, predictability, and avoidance of surprises and rework.	1. Convene a recurring inter-departmental meeting to discuss projects currently in process and future projects that may require assistance from one or more of the other IR departments. 2. Build a department-by-department index of key people, their role, and their area of responsibility. Identify a concierge person in each department as the "go to" person when seeking help from that department's resources.	**Management Action Plans:** 1. A monthly recurring inter-departmental project status meeting will be put in place. 2. Management agrees. An index of key people and their role will be created by department, with a central resource person identified in each of the five IR departments. **Action Plan Owners:** Vice President and Chief Information Officer **Target Completion Dates:** 1. November 30, 2015 2. December 31, 2015

Detailed Observations and Action Plans Matrix

Observation	Recommendation	Management Response
Risk Rating: Medium 🟡 **4. Enhance Customer Service orientation across IR.** Based on customer feedback, there are opportunities for IR to provide better customer service. The following comments were made by business owners: • IR Project business owners are frustrated with delays, poor communication, and lack of structure, poor responsiveness, broken processes, and finger pointing. • IR Project business owners have experienced delays in the implementation of their projects. This has created stress for the customer and, in some cases, increased costs to their project. On occasion, these frustrations have escalated outside IR. Five of the ten Business Owners surveyed mentioned that communication from IR was an issue, including: • Intermittent communication by IR during project development, project schedule status, and implementation date. • Repeated attempts to obtain project information from IR, causing frustration and a sense of inefficiency.	1. Develop a Customer Satisfaction Survey for distribution to the executive sponsor, business owner(s), and key users of the project following the completion of each project. The Survey provides a documented means to evaluate the performance of the project leader and the project team. Thus, it becomes a learning tool for continuous improvement. Survey categories should include, but are not limited to, communication, timeliness, quality, creativity, professionalism, cost, and value. See Appendix B, Post-Implementation Review, p. 17. The Chief Information Officer should consider periodic review and sign-off the project surveys with each IR department leader. 2. Develop a written Customer Service Statement which will help mold and positively shape staff perspective and behavior. Conduct staff training and discussion sessions in each department about how Customer Service can and should change. 3. Consider establishing a dedicated position similar to other institutions (e.g., Yale and Cal-Tech) to foster greater quality customer service and communication across IR.	**Management Action Plans:** 1. Going forward, all IR projects will conduct a post-implementation review. This review effort will include a Customer Satisfaction survey to all key users and Business Owners. In addition, Time Management Schedule, Budget-to-Actual, and "Lessons Learned" documents will be created and reviewed. 2. Each IR department will create a Customer Service statement and periodic training sessions will be conducted. **3.** We agree with the recommendation. We will determine the appropriate person to be responsible for oversight of activities to foster customer across IR. **Action Plan Owners:** Vice President and Chief Information Officer **Target Completion Dates:** 1. November 30, 2015 2. Customer Service statement for each IR department completed by January 31, 2016. IR Customer Service training sessions will occur periodically with at least the first session occurring in each of the IR departments by the end of April 30, 2016. 3. November 30, 2015

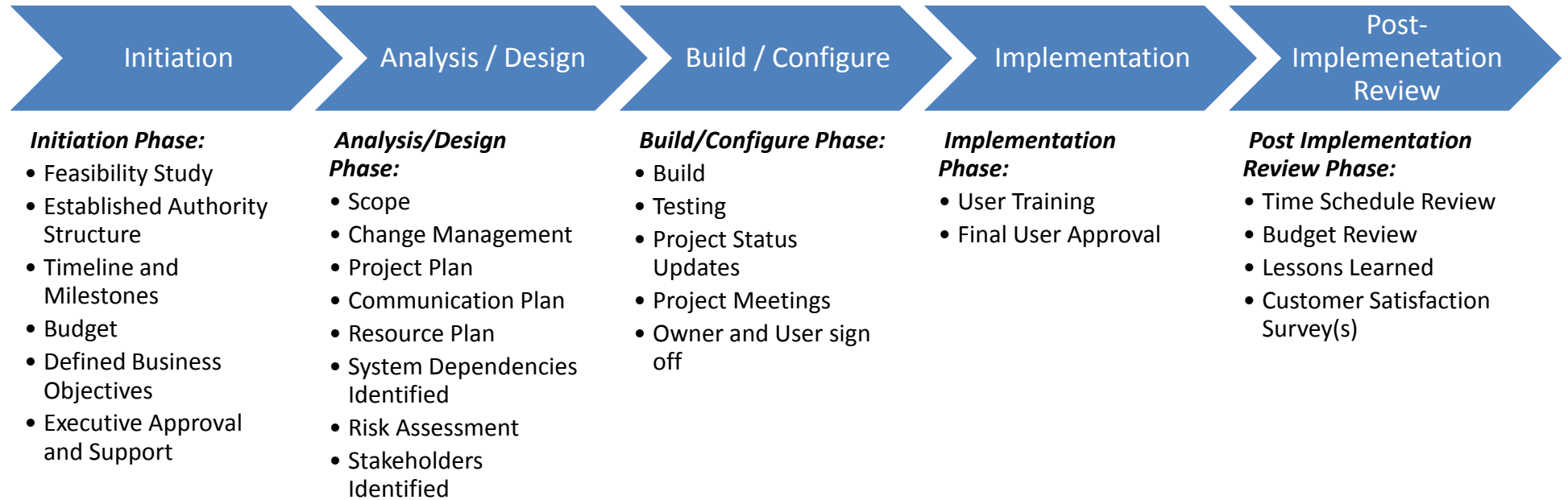# Appendix A – Risk Classifications and Definitions

As you review each observation within the Detailed Observations and Action Plans Matrix of this report, please note that we have included a color-coded depiction as to the perceived degree of risk represented by each of the observations identified during our review. The following chart is intended to provide information with respect to the applicable definitions and terms utilized as part of our risk ranking process:

Risk Definition - The degree of risk that exists based upon the identified deficiency combined with the subsequent priority of action to be undertaken by management.	Degree of Risk and Priority of Action	
	High	The degree of risk is unacceptable and either does or could pose a significant level of exposure to the organization. As such, immediate action is required by management in order to address the noted concern and reduce risks to the organization.
	Medium/High	The degree of risk is substantially undesirable and either does or could pose a moderate to significant level of exposure to the organization. As such, prompt action by management is essential in order to address the noted concern and reduce risks to the organization.
	Medium	The degree of risk is undesirable and either does or could pose a moderate level of exposure to the organization. As such, action is needed by management in order to address the noted concern and reduce risks to a more desirable level.
	Low	The degree of risk appears reasonable; however, opportunities exist to further reduce risks through improvement of existing policies, procedures, and/or operations. As such, action should be taken by management to address the noted concern and reduce risks to the organization.

It is important to note that considerable professional judgment is required in determining the overall ratings presented on the subsequent pages of this report. Accordingly, others could evaluate the results differently and draw different conclusions.

It is also important to note that this report provides management with information about the condition of risks and internal controls at one point in time. Future changes in environmental factors and actions by personnel may significantly and adversely impact these risks and controls in ways that this report did not and cannot anticipate.Project Management is the process and activity of planning, organizing, motivating, and controlling resources, procedures and protocols to achieve specific goal.

Appendix B – "Best Practices" Project Management Documentation

Initiation	Analysis / Design	Build / Configure	Implementation	Post-Implemenetation Review

Initiation Phase:
- Feasibility Study
- Established Authority Structure
- Timeline and Milestones
- Budget
- Defined Business Objectives
- Executive Approval and Support

Analysis/Design Phase:
- Scope
- Change Management
- Project Plan
- Communication Plan
- Resource Plan
- System Dependencies Identified
- Risk Assessment
- Stakeholders Identified

Build/Configure Phase:
- Build
- Testing
- Project Status Updates
- Project Meetings
- Owner and User sign off

Implementation Phase:
- User Training
- Final User Approval

Post Implementation Review Phase:
- Time Schedule Review
- Budget Review
- Lessons Learned
- Customer Satisfaction Survey(s)

Document Descriptions:

Initiation

Feasibility Study: This document includes a gap analysis of what is currently in place and what is desired. It also includes a cost benefit analysis and cost justification.

Established Authority Structure: This document establishes the authority structure of the department managing the project. This should include chain of command, escalation procedures and reporting structure.

Timeline: This document records an educated estimate when the project should reach key milestones. This should include: milestones, dates the milestones are expected to be completed and critical paths.

Budget: this document records the expected cost of the project overall. This should include: Monetary value needed for the project and allocation of these values by component, phase, or resource.

Appendix B – "Best Practices" Project Management Documentation

Defined Business Objectives: This document defines the purpose of the project. This should include objective of the project and alignment with the UTSW mission and goals.

Executive Approval: This document records the support of executive management. This should include a signature of the appropriate executive showing support and approval of the project about to be implemented.

Analysis / Design
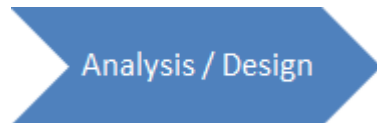
Scope: This document records the purpose of the project. This should include the goals of the project and what is being attempted to be achieved; this document should also include items that are out of scope, or not a goal or objective of the project.

Change Management: This document records the procedure for changes made to the project plan or scope. This should include who has authority to make the changes and how these changes are approved. As well as, a record of what is being changed and if it was approved or not. If the change was not approved what reason was it not approved.

Project Plan: Also known as Project Charter: This document is the main method of communicating the key aspects of a project. This document may contain similar documents discussed above.

Communication Plan: This document records the procedure for how often and when certain contacts are reached out to. This document should include a contact list of all key contacts, description of the method or medium used to communicate with these key contacts, how often they will be contacted, and what should be communicated to the contacts.

Resource Plan: This document is similar to a budget mentioned above. This document allocates resources that were not listed or purchased in the budget, i.e. parts already on hand. This document should list the resources needed and show their allocation to the project, as well as the current amount of resources already on hand.

System Dependencies Identified: This category has two documents. The first document is the system dependencies unique to the project undertaken. It should list all systems that will be affected by the project being implemented. The second document is the system dependencies inventory. This document is a master file that records the dependencies of systems as new dependencies are found. This should include the business owner of the system as well as how the system can be affected.

Risk Assessment: This document records risk associated with the project that would hinder it from achieving its goals and objectives. This should include a list of risks, the level of risk assigned to each of the risks, and action to be taken to reduce the risk.

Appendix B – "Best Practices" Project Management Documentation

Stakeholder Identification: This document records all contacts that will be affected by the project, manage the project, or support the project. This should include names, positions, relation to the project, and means of contacting.
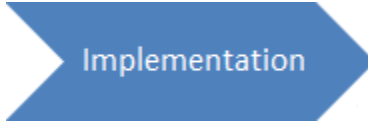

Build / Configure

Project Status Updates: This document is used to give status updates on the project as it is being built or configured. This should include % complete, any issues that have been discovered, if the project is on or over budget for both money and time, and any concerns any party may have.

Project Meetings: This document is used to provide insight on the decisions made thought out the projects lifecycle. This should include who attended the meeting, what was discussed, conclusions to what the meeting, and any follow up actions that were required.

User-sign off: This document is used to show the approval of the business owner or owners so the project may move on to the next phase. This should include a signature of business owner show approval to go on to implementation.

Testing: This document records the methods used to test the system prior to implementation. This should include the procedure used to test the system, who participated in the testing, the results of the tests, and actions to be taken from the results.

Implementation

User Training: This document is used to record the methods used to train the affected users of the project. This should include the training method used, timeline for the training, people included in the training and feedback from the users.

Final User Approval: This document is used to close the project. It should include a signature of the business owner showing the project has been fully implemented and functional and the project owner has fulfilled all relevant tasks and objectives related to the project.

Appendix B – "Best Practices" Project Management Documentation

Post-Implemenetation Review

Time-schedule Review: This document records the final time actually used for the project and compares it to what was budgeted. This should include actual time, budgeted time, explanation of why the project was over or under budget and analysis of what phases of the project went over budget.

Budget Review: This document records the final amount of money the project actually used and compares it to what was budgeted. This should include actual funds used, budgeted funds, explanation of why the project was over or under budget and analysis of what areas of the project went over budget.
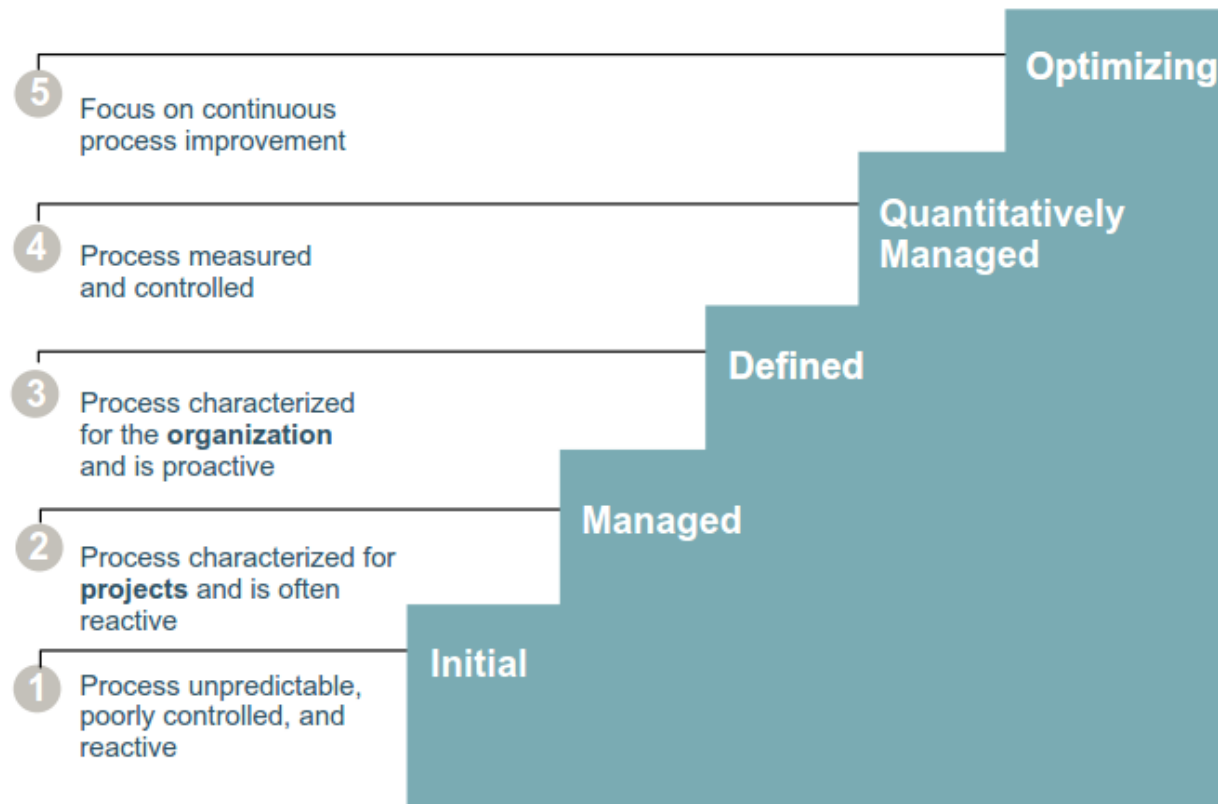
Lessons Learned: This document records the successes and shot comings of the project. It should include an in detail analysis of what went good with the project, what went wrong, how to avoid short comings in the future, what was unexpected, and what was the overall performance of the project.

Customer Satisfaction Survey: The Survey provides a documented means to evaluate the performance of the project leader and the project team. Thus, it becomes a learning tool for continuous improvement. Survey categories should include, but are not limited to, communication, timeliness, quality, creativity, professionalism, cost, and value. To view an example survey and suggested content, follow the link provided: http://pm-foundations.com/tag/customer-satisfaction-survey/.

Appendix C – "Best Practices" IR Project Management Maturity Model

The Maturity Levels

- 5 — Focus on continuous process improvement — Optimizing
- 4 — Process measured and controlled — Quantitatively Managed
- 3 — Process characterized for the **organization** and is proactive — Defined
- 2 — Process characterized for **projects** and is often reactive — Managed
- 1 — Process unpredictable, poorly controlled, and reactive — Initial

Level 1 – Initial

- Processes are usually ad hoc and the organization usually does not provide a stable environment. Success in these organizations depends on the competence and heroics of the people in the organization and not on the use of proven processes. In spite of this ad hoc, chaotic environment, maturity level 1 organizations often produce products and services that work; however, they frequently exceed the budget and schedule of their projects.
- Organizations are characterized by a tendency to over commit, abandon processes in the time of crisis, and not be able to repeat their past successes again.
- Software project success depends on having quality people.

Appendix C – "Best Practices" IR Project Management Maturity Model

Level 2 – Managed

- Software development successes are repeatable. The processes may not repeat for all the projects in the organization. The organization may use some basic project management to track cost and schedule.
- Process discipline helps ensure that existing practices are retained during times of stress. When these practices are in place, projects are performed and managed according to their documented plans.
- Project status and the delivery of services are visible to management at defined points (for example, at major milestones and at the completion of major tasks).
- Basic project management processes are established to track cost, schedule, and functionality. The minimum process discipline is in place to repeat earlier successes on projects with similar applications and scope. There is still a significant risk of exceeding cost and time estimate.

Level 3 – Defined

- The organization's set of standard processes, which is the basis for level 3, is established and improved over time. These standard processes are used to establish consistency across the organization. Projects establish their defined processes by the organization's set of standard processes according to tailoring guidelines.
- The organization's management establishes process objectives based on the organization's set of standard processes and ensures that these objectives are appropriately addressed.
- A critical distinction between level 2 and level 3 is the scope of standards, process descriptions, and procedures. At level 2, the standards, process descriptions, and procedures may be quite different in each specific instance of the process (for example, on a particular project). At level 3, the standards, process descriptions, and procedures for a project are tailored from the organization's set of standard processes to suit a particular project or organizational unit.

Level 4 – Quantitatively Managed

- Using precise measurements, management can effectively control the software development effort. In particular, management can identify ways to adjust and adapt the process to particular projects without measurable losses of quality or deviations from specifications. At this level organization set a quantitative quality goal for both software process and software maintenance.
- Sub-processes are selected that significantly contribute to overall process performance. These selected sub processes are controlled using statistical and other quantitative techniques.
- A critical distinction between maturity level 3 and maturity level 4 is the predictability of process performance. At maturity level 4, the performance of processes is controlled using statistical and other quantitative techniques, and is quantitatively predictable. At maturity level 3, processes are only qualitatively predictable.

Appendix C – "Best Practices" IR Project Management Maturity Model

Level 5 – Optimizing

- Focusing on continually improving process performance through both incremental and innovative technological improvements. Quantitative process-improvement objectives for the organization are established, continually revised to reflect changing business objectives, and used as criteria in managing process improvement. The effects of deployed process improvements are measured and evaluated against the quantitative process-improvement objectives. Both the defined processes and the organization's set of standard processes are targets of measurable improvement activities.

- Process improvements to address common causes of process variation and measurably improve the organization's processes are identified, evaluated, and deployed.

- Optimizing processes that are nimble, adaptable and innovative depends on the participation of an empowered workforce aligned with the business values and objectives of the organization. The organization's ability to rapidly respond to changes and opportunities is enhanced by finding ways to accelerate and share learning.

- A critical distinction between maturity level 4 and maturity level 5 is the type of process variation addressed. At maturity level 4, processes are concerned with addressing special causes of process variation and providing statistical predictability of the results. Though processes may produce predictable results, the results may be insufficient to achieve the established objectives. At maturity level 5, processes are concerned with addressing common causes of process variation and changing the process (that is, shifting the mean of the process performance) to improve process performance (while maintaining statistical probability) to achieve the established quantitative process-improvement objective.