5.0 PROJECT MANAGEMENT

Professional and conscientious project management is critical to a successful project outcome. It is critical for State agency staff to oversee the tasks and deliverables, ensure that the project is being implemented as stated in the Planning APD (PAPD) or Implementation APD (IAPD), and maintain overall project management responsibility. It is incumbent upon the State agency requesting Federal funding to provide project management resources appropriate to the level of project complexity being undertaken. The purpose of this chapter is to provide State agencies with guidance and direction in managing information technology (IT) projects.

Difficulties related to project management may occur in the following areas:

- Giving the contractor too much control, responsibility, and/or authority on behalf of the State (i.e., abdicating strategic decision making and fiscal responsibilities)
- Not managing changes to the project scope, also known as "scope creep" (adding functions to a task once development is underway)
- Placing a large focus on front end/user interface modules while neglecting other critical elements of the system such as security
- Delaying or neglecting management reporting
- Staying abreast of all the aspects of the APD budget, not just the implementation contractor costs
- Not obtaining prior approval from all applicable Federal agencies, including approval of changes and updates
- Not realizing that APD Updates (APDU) must be submitted and approved by FNS before new significant costs may be incurred (i.e., erroneously thinking retroactive approval can be sought).

Successfully managing systems projects includes identifying requirements; establishing goals; balancing demands of quality, time, scope, and cost; and adapting the specifications, plans, and approach to meet the needs and expectations of stakeholders. Successful system development and implementation requires the State agency to take the following actions:

- √ Assign a full-time experienced, formally trained professional project manager. A certified Project Management Professional (PMP) is highly desirable and can be acquired by using qualified State or contracted resources.
- √ Develop a project plan before starting the project. The project plan should include a high-level Work Breakdown Structure (WBS); a schedule; and risk, staffing, quality, and communications plans.
- √ Ensure the system design reflects sound planning.
- √ Set clear performance expectations and establish a communications protocol with all contractors involved in the project.
- √ Build plenty of time into the project schedule for State internal and Federal review and approval of all required documents.
- √ Fully describe and document the business and process changes of the project.
- √ Make extensive testing a priority (e.g., performance, usability, acceptance, and regression testing).
- √ Use pilot testing to discover problems that could become disastrous during rollout and beyond, and provide

documentation of the pilot evaluation to FNS.

- √ Do not start rollout beyond the pilot until all testing is complete.
- √ Plan a reasonable rollout schedule in phases to provide the opportunity for making course corrections and adjustments along the way. A phased approach is more desirable; avoid a big bang approach.
- √ Make contingency plans for the unexpected as well as the anticipated problems.
- √ Train all workers in a timely fashion - not too early, and not too late.
- √ Provide appropriate training, explicitly for the kind of work the individuals will be doing.
- √ Invite feedback throughout the process.
- √ Broadcast achievements throughout the process.
- √ Manage expectations.
- √ Identify and manage stakeholders.
- √ Turn to Federal and State partners for technical assistance whenever necessary.

5.0.1 Project Management Knowledge

The Project Management Institute (PMI®) is a professional organization acknowledged as a pioneer in the field of project management. PMI's *A Guide to the Project Management Body of Knowledge* (PMBOK®) is the only American National Standards Institute (ANSI) standard for project management. PMI has identified the following ten topic areas to define the scope of project management knowledge:

Project Integration Management—The processes required to ensure that the various elements of the project are properly coordinated. These include the project charter, project plan development, project plan execution, integrated change control, and project closure.

Project Scope Management—The processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. It consists of initiation, scope planning and definition, scope verification, and scope change control. Scope management also includes creating the WBS.

Project Time Management—The processes required to ensure timely completion of the project, including activity definition, activity sequencing, schedule development, and schedule control, as well as analyzing activity sequences, activity durations, and resource requirements to create the project schedule.

Project Cost Management—The processes required to ensure that the project is completed within the approved budget. It consists of resource planning, cost estimating, cost budgeting, and cost control.

Project Quality Management—The processes required to ensure the project will meet the requirements and needs for which it was approved consists of the following:

- √ *Quality planning*—Identifying the quality standards relevant to the project and determining how to satisfy them
- √ *Quality assurance*—Evaluating overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards
- √ *Quality control*—Monitoring specific project results to determine whether they comply with relevant quality

standards and identifying ways to eliminate causes of unsatisfactory performance.

Project Human Resource Management—The processes required to make the most effective use of the people involved with the project, those who organize and manage the project team. It consists of organizational planning, staff acquisition, and team development.

Project Communications Management—The processes required to ensure timely and appropriate generation, collection, dissemination, storage, and ultimate disposition of project information. It consists of communications planning, information distribution, performance reporting, and administrative closure of the project.

Project Risk Management—The systematic process of identifying, analyzing, and responding to project risk. It includes maximizing the probability and consequences of positive events and minimizing the probability and consequences of adverse events to project objectives. Activities include risk management planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning, and risk monitoring and control.

Project Procurement Management—The processes required for acquiring goods and services to attain project scope from outside the performing organization. It consists of procurement planning, solicitation planning, solicitation, source selection, contract administration, and contract closeout (see Chapter 6 for details). Project Procurement Management should serve the following purposes:

- √ Provide an open, fair, and competitive process that minimizes opportunities for corruption and ensures the impartial selection of a contractor
- √ Avoid potential and actual conflicts of interest or the appearance of a conflict of interest
- √ Establish an objective basis for contractor selection
- √ Obtain the best value in terms of price and quality
- √ Document the requirements that a contractor must meet to obtain payment
- √ Provide a basis for evaluating and overseeing the work of the contractor
- √ Allow flexible arrangements for obtaining products and services given the particular circumstances, provided such arrangements do not violate the other purposes of Project Procurement Management.

Project Stakeholder Management – The processes required to identify all people or organizations impacted by the project, analyzing stakeholder expectations and their impact on the project, and developing appropriate management strategies for effectively engaging stakeholders in project decisions and execution. These processes include identifying stakeholders, planning stakeholder management, managing stakeholder engagement, and controlling stakeholder engagement.

This handbook does not address each of these areas in detail. To supplement this chapter, IT project managers should refer to additional resources (see Section 5.9), colleagues in other State agencies, and best practices.

5.0.2 Project Management Skills

An effective project manager and team are expected to understand and use skills from the following areas of expertise:

- √ Application area knowledge, standards, and regulations (e.g., functional, technical, financial, and

procurement)

- √ The project environment (i.e., cultural, social, and political)
- √ General management skills and knowledge
- √ Communication skills
- √ Interpersonal skills.

Further information can be obtained from PMI's website (www.pmi.org) or its publication, *A Guide to the Project Management Body of Knowledge*.

5.1. PROJECT MANAGEMENT ROLES AND RESPONSIBILITIES

It is important to have a defined formal structure for the project and for the project staff. This provides each individual with a clear understanding of the authority given and responsibility necessary for the successful accomplishment of project activities. Project team members need to be accountable for the effective performance of their assignments and achievement of the project goals and objectives.

A successful project requires the project team to have the authority to complete a project, be participants (at some level) in the planning process, have ownership of and buy-in to the project management plan, and be responsible and accountable for completion of the project. The roles and responsibilities of project participants will vary. The requirements placed on participants will be determined and defined during the project management planning process; however, the following is a good "rule of thumb" perspective:

- √ The project manager should be full-time and "do no work" except manage the project.
- √ On a large project, individual role assignments may require full-time attention to the function.
- √ On smaller projects, role assignments may be performed part-time, with staff sharing in the execution of multiple functions.

Tasking and individual responsibilities are covered in the Section 5.4 described later in this chapter, as activity assignments are defined in the planning process. Typically, these assignments are shorter term and exist only until the completion of the activity deliverable.

5.1.1. Key Project Management Stakeholders

Stakeholders are individuals and organizations who have a vested interest in the success of the project. The identification and input of stakeholders help to define, clarify, drive, change, and contribute to the scope, cost, timing, quality, and ultimately the success of the project. To ensure project success, the project management team needs to identify stakeholders early in the project, determine their needs and expectations, and manage and influence those expectations over the course of the project.

A project team includes a diverse combination of people who share the responsibility for accomplishing project goals and managing the performance of the project work activities and typically include the following members:

Program Manager—Defines and initiates projects and assigns project managers to manage cost, schedule, and performance of component projects, while working to ensure the ultimate success and acceptance of the program. The program manager maintains continuous alignment of program scope with strategic business objectives and makes recommendations to modify the program to enhance effectiveness toward the business result or strategic intent. The program manager is responsible for determining and coordinating the sharing of resources among his/her

constituent projects to the overall benefit of the program.

Project Director—Responsible for strategic planning and decision making, as well as fiscal responsibilities for the project. This provides a separation of duties from the daily project management provided by the project manager. A program manager may serve as a project director but not as a project manager.

Project Manager—Responsible for leading the team through the Systems Development Life Cycle (SDLC) activities and has ultimate responsibility for project success. The project manager is also responsible for reviewing deliverables for accuracy, approving deliverables, and providing status reports to management.

Project Team—Team members (State program, Financial Management (FM), and IT staff; their contractors; and FNS) are responsible for accomplishing assigned tasks as directed by the project manager or per Federal and State regulations. FNS and State staff typically provide advice and counsel for the project manager on the conduct of SDLC activities and requirements for the APD process.

A project team may work in the same location or may be separated by distance and function as a virtual team (i.e., fulfills its project obligations with little or no time spent face-to-face). In order to ensure that all team members have clear expectations of proper behavior, it is important that ground rules be established at the beginning of a project and addressed in the project management plan.

Managing projects with multiple stakeholders can be challenging. Successful management of these projects requires addressing each group's point of view. The following are keys to successful project management:

- √ Ensure strong, committed executive management support
- √ Connect the business goals to IT
- √ Communicate objectives frequently
- √ Establish clearly defined principles so that no one is unsure about how to proceed
- √ Review projects after they are finished to determine whether they are yielding the expected benefits
- √ Recognize different perspectives to reflect the concerns and interests of the various stakeholders
- √ Be proactive
- √ Give IT and program subject matter experts a seat at the business table
- √ Recognize that everyone shares success; just as stakeholders have their specific interests in projects, they also all contribute to the success.

Surveys show that companies that performed well in delivering projects, regardless of size or industry sector, excelled in four key areas:

- **Effective project management,** with an emphasis on strong leadership and a structured project environment
- **Good project definition at the outset**, stating the objective, business benefits and timescales for delivery
- **Supportive sponsorship** throughout the project, at a high enough level within the company to overcome obstacles both within and outside the organization
- **Effective change control** that allows enough flexibility to meet changing demands without losing control of project delivery.

5.1.2. Project Management Life Cycle

Two different life cycles work in conjunction throughout the course of every project. The *project* life cycle describes the tasks that must be completed to produce a product or service. Different project life cycles exist for specific products and services. The project *management* life cycle defines how to manage a project and mirrors the SDLC. This will always be the same, regardless of the product or service and project life cycle being employed. Most processes and deliverables are required for all projects, although in smaller projects they may require less formality and a lower level of effort.

In any approach, the basic SDLC processes must be performed—what differs is the timing of their execution. While no two development efforts are alike (and different methodologies may refer to these processes by different names), all projects should progress through the same six processes or disciplines:

System Initiation—The business case and proposed solution are re-examined to ensure they are still appropriately defined and address an organizational need. A high-level schedule is developed for subsequent SDLC phases.

Systems Requirements Analysis—The needs of the business are captured in as much detail as possible.

System Design—Builds on the work performed during systems requirements analysis and results in a translation of the functional requirements into a complete technical solution. The completion of system design marks the point in the project at which the program manager should be able to plan, in detail, all future project phases.

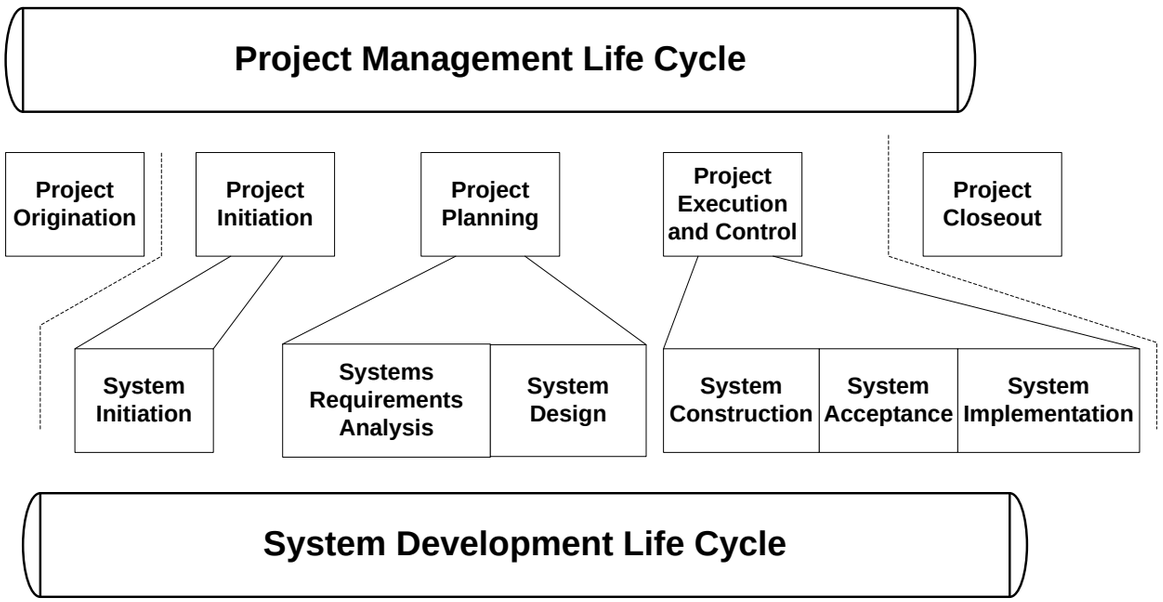
System Construction—The project team builds and tests the various modules of the application, including any utilities that will be needed during system acceptance and system implementation. Documentation and training materials are developed during this phase.

System Acceptance—Focuses on system testing and validation by those who will ultimately use the system to execute their daily processes. In addition to confirming the system meets functional expectations; activities also validate all aspects of data conversion and system deployment.

System Implementation—The final phase, which includes training, installation of the system in a production mode, and transition of application ownership from the project team to the State agency.

The phases of the SDLC generally align with the phases of the project management life cycle; however, SDLC phases do not correspond on a one-to-one basis with the project management phases. This varies by the methodology used.

Figure 5-24. Project Management Life Cycle



Project Origination—In the Project Origination phase, an individual or group proposes a project to create a product or develop a service that can solve a problem or address a need in the organization. The organization then submits the proposal to an evaluation and selection process (as determined by the State or State agency). If selected, a budget or further management commitment for the project may be required also before a project manager is actually assigned and the project is authorized to progress to Project Initiation. A time delay between the project's proposal and selection and its actual initiation may occur.

Project Initiation—The purpose of the Project Initiation phase is to begin defining the overall parameters of the project and establish the appropriate project management and quality environment required to complete the project. A project manager is assigned at the beginning of this phase. Successful projects begin with a detailed project definition that is understood and accepted by stakeholders. The following processes occur during this phase:

Prepare for the Project—Identify the project sponsor and the initial project team and work with the project manager to create the project charter and conduct a project kick-off meeting. The project charter documents critical success factors and defines and secures commitment for the resources required to complete the Project Initiation phase. The charter also documents the project's mission, history, and background; describes the business problem the project is intended to resolve; and lists the benefits to be realized as a result of implementing the product or service.

√ **Define Cost/Scope/Schedule/Quality**—The project manager and project team define the scope of the project, the preliminary budget, a high-level schedule (see Section 5.4), and quality standards to complete the project. Defining project scope may consist of a formal scope statement that includes the business need the project will address, what the project will accomplish, how it will be accomplished and by whom, what the end result of the project will be, a list of project deliverables, and critical success factors. Establishing the preliminary project budget requires the project manager to be aware of existing resource acquisition policies, guidelines, and procedures as well as any constraints on how resources may be acquired.

√ **Perform Risk Identification**—Identify and document any risks associated with the project, including

cultural, technology, impact on work units, and various other internal and external areas.

- √ **Develop Initial Project Plan**—The project manager and project team identify all stakeholders and document their involvement in the project, develop means of communicating with them, and compile all documentation created during Project Initiation to produce the initial project plan. Establishing status meeting and status report frequency and format up front is a key step to ensuring all stakeholders are involved and kept informed of the project activities.
- √ **Confirm Approval to Proceed to the Next Phase**—The project manager reviews and refines the business case, secures resources required for the Project Planning phase, and prepares the formal acceptance package for review and approval by the project sponsor.

Some State agencies hold a meeting at the beginning of Project Initiation at which all potential stakeholders come together to review the project proposal, discuss required roles, and assign project team members. Establishing a project team may be a less formal process.

Project Planning—The purpose of project planning is to define the *exact* parameters of the project and ensure that all prerequisites for project execution and control are in place. Planning builds on the work performed during initiation. Project planning consists of the following phases:

- √ **Project Planning Kick-off**—The Project Manager conducts a meeting to formally begin the Project Planning phase, orient new team members, and review the documentation and current status of the project. Useful information and topics include organization charts for the project team and information on roles and responsibilities, logistics, and project procedures.
- √ **Refine the Cost, Scope, Schedule, and Quality Standards of the Project**—To more accurately reflect additional information learned about the project, it may be useful to break down each deliverable in the project scope into smaller components to define them in the greatest detail. Each deliverable should be clearly defined; clearly state what will be done to complete the work and what will not be done; have an estimated time to complete the component; and have an assigned dollar value to the cost of completing the work.
- √ **Perform Risk Assessment**—The project team and project manager review the list of risks identified, identify new risks, evaluate each risk based on the likelihood of its occurrence and the magnitude of its impact, and develop a formal risk management plan to respond to each risk. Risks require continual review at each phase of the project.
- √ **Refine Project Plan**—Develop all required management processes and plans for team development and project execution and implementation. Examples include the definition of a contract management plan (including acceptable performance criteria), change control process, acceptance management process, issue management and escalation process, organizational change management plan, project implementation and transition plan, and establishing time and cost baseline.
- √ **Confirm Approval to Proceed to the Next Phase**—The project manager reviews and refines the business case, secures resources required for Project Planning, and prepares the formal acceptance package for review and approval by the project sponsor.

Project Execution and Control—The purpose is to develop the system. It is the longest phase of the project management life cycle and where most resources are applied. It uses all the plans, schedules, procedures, and templates that were prepared and anticipated in prior phases. The conclusion of the phase arrives when the product is fully developed, tested, accepted, implemented, and transitioned to operational. Accurate records need to be kept

throughout this phase because they serve as input to the final phase, Project Closeout. The following processes generally occur during this phase:

√ **Conduct Project Execution and Control Kick-off**—The project manager conducts a meeting to formally begin this phase, orient new team members, and review the documentation and current status of the project.

√ **Manage Cost, Scope, Schedule, and Quality Standards**—The project manager must manage changes to project scope and schedule, implement Quality Assurance (QA) and Quality Control (QC) processes according to the quality standards, and control and manage costs established in the budget. QC is implemented and should be performed throughout the course of the project. Successful QC processes always strive to see quality through the eyes of the customer.

√ **Manage and Control Risks**—The project manager and team use the risk management plan and develop and apply new response and resolution strategies to any unexpected events.

Manage Project Execution—The project manager must manage every aspect of the project plan to ensure that all work is being performed correctly and on time. This includes but is not limited to managing change control, deliverable acceptance, test results and documentation, issues, organizational change, the project team, and project transition, as well as executing the communications plan.

√ **Change Control**—During Project Planning, the project manager refines the project scope to clearly define the content of the deliverables to be produced during Project Execution and Control. This definition includes a clear description of what will and will not be included in each deliverable. The process used to document and control changes is documented in the project plan. Even if a change is perceived to be very small, exercising the change process ensures that all parties agree to the change and understand its potential impact. As part of managing change, one of the project manager's functions is to ensure that the project produces all the work but ONLY the work required and documented in the project scope. Any deviation **to what appear**s to be in the scope document is considered change and must be handled using the change control process.

The change control process describes the following:

- The definition of change and how to identify it
- How requests for change will be initiated
- How requests for change will be analyzed to determine whether they are beneficial to the project
- The process to approve or reject changes
- How funding will be secured to implement approved changes.

The project manager may want to maintain an "acceptance log" in the project status report to track the status of deliverables as they go through iterations of the acceptance process. The project manager should be concise and clear in both written and verbal messages; solicit feedback to determine if messages have been received and interpreted correctly; in addition to conducting regular status meetings, use the status report to drive the meeting discussion points. If the project manager revises the baseline as a result of change control, he/she should be sure to save the original baseline for historical purposes.

√ **Gain Project Acceptance**—The customer formally acknowledges that all deliverables have been completed, fully tested, accepted, and approved, and that the product or service has been successfully transitioned to an operational environment. This would also include FNS approvals, when required.

Project Closeout—The purpose of the Project Closeout phase is to assess the project and derive any lessons learned and best practices to be applied to future projects. See Section 5.8 for FNS formal close-out procedures and requirements. This final phase consists of the following processes:

- √ **Conduct Post-Implementation Review**—The project manager assesses the results of the project by soliciting feedback from team members, customers, and stakeholders. These results may be communicated in a post-implementation report. The project manager should not wait to get feedback from the project team, but should spend the time to review the project and to understand what was done correctly and incorrectly. He/she should concentrate on what is important in the feedback, prioritize the comments, and select those that may be of use to other projects and document them as generically as possible.
- √ **Perform Administrative Closeout**—The project manager formally closes the project by providing performance feedback to team members and archiving all project information.

5.2. SYSTEM DEVELOPMENT LIFE CYCLE METHODOLOGIES

There are many different methodologies employed for system development projects. Methodologies may be driven by the application development tools; by the software architecture within which the application will operate; or by the "build versus buy" decision. However, there are standard phases and processes that all system development projects should follow, regardless of environment and tools. This section describes a few of the more common methodologies in use with systems development.

5.2.1. Waterfall Methodology

Any project can be better managed when it is segmented into a hierarchy of chunks such as phases, stages, activities, tasks, and steps. In system development projects, the simplest rendition of this is called the "waterfall" methodology. The waterfall method is a linear process, meaning it progresses stage by stage and is sequential in that it progresses in order from project initiation to project completion. The waterfall methodology presumes that the system requirements have already been defined and refined exhaustively, which is probably the most important step toward project success. The waterfall model illustrates a few critical principles of a good methodology:

- Work is done in stages
- Content reviews are conducted between stages
- Reviews represent quality gates and decision points for continuing.

The waterfall provides an orderly sequence of development steps and helps ensure the adequacy of documentation and design reviews to promote the quality, reliability, and maintainability of the developed software. Although many IT professionals believe the waterfall methodology is slow and cumbersome, it does illustrate sound principles of life cycle development and is used widely throughout the public and private sector.

5.2.2. Iterative Methodologies

Given the time it takes to develop large, sophisticated software systems, it is not possible to define the problem and build the solution in a single step. Requirements will often change throughout a project's development as a result of architectural constraints, customer needs, or a better understanding of the original problem. Iteration allows the project to be successively refined and addresses a project's highest risk items as the highest priority task.

The basic idea behind iterative enhancement is to develop a software system incrementally, allowing the developer to take advantage of what was learned during the development of earlier, incremental, deliverable versions of the

system. Learning comes from both the development and use of the system, where possible. Key steps in the process are to start with simple implementations of a subset of the software requirements and iteratively enhance the evolving sequence of versions until the full system is implemented. Design modifications are made at each iteration, and new functional capabilities are added within the scope of the project.

Spiral Methodology

The ultimate evolution from the waterfall is the spiral, which takes advantage of the fact that development projects work best when they are both incremental and iterative and the team is able to start small and benefit from enlightened trial and error along the way.

With the spiral methodology there is a lot of upfront design for the project which is then broken up into iterations with more emphasis on risk analysis. It uses the phases of Objective Determination, Risk Analysis, Develop and Test, then Plan the next iteration. Prototyping is used during each iteration and customer feedback is relied upon for improvements and changes to be incorporated into the next iteration. An iteration can be from 6 months to 2 years and each iteration builds on the baseline iteration.

Agile Development Methodology

Agile development also occurs incrementally, but has shorter iterations than spiral development. In agile, small teams work together with a stakeholder or Product Owner to define quick prototypes, proof of concepts, or other visual means to describe the problem to be solved. The team defines the requirements for the iteration, develops the code, conducts testing, and the users then verify the results through user acceptance testing. At the end of each iteration is a working code. Agile is adaptive in that changing requirements can be integrated into future iterations and may be time blocked.

5.3. RISK MANAGEMENT

To ensure project integrity, it is important to adopt and practice continuous project risk management. It should commence prior to contract award and be a factor in the award process. The challenge in selecting and following a methodology is to do it wisely—to provide sufficient process disciplines to deliver the quality required for business success, while avoiding steps that waste time, squander productivity, demoralize developers, and burn limited resources. The best approach for applying a methodology is to consider it as a means to manage risk. State agencies can identify risks by looking at past projects and learning from the mistakes of others. Common areas of risk include the following:

- Poorly defined requirements
- Scope creep
- Lack of stakeholder management
- Political pressure
- Subcontractor management
- Inadequate planning
- Miscommunication
- Lack of focus

- Procurement process delays
- Failure to secure prior Federal approval and funding
- Incremental or limited funding
- Inadequate State agency oversight and project management
- Turnover of key staff.

5.3.1. Integration of Risk Management into the SDLC

Minimizing negative impact on an organization and need for sound basis in decision making are the fundamental reasons organizations implement a risk management process for their IT systems. Effective risk management must be totally integrated into the SDLC. However, the risk management methodology is the same regardless of the SDLC phase for which the risk management assessment is being conducted. Risk management is an iterative process that can be performed during each major phase of the SDLC. Figure 5-3 describes the characteristics of each SDLC phase and indicates how risk management can be performed in support of each phase.

SDLC Phase	Phase Characteristics	Support from Risk Management Activities
Initiation	The need for an IT system is expressed and the purpose and scope of the IT system is documented.	Identified risks are used to support the development of the system requirements, including security requirements, and a security concept of operations (strategy).
Development	The IT system is designed, purchased, programmed, developed, or otherwise constructed.	The risks identified during this phase can be used to support the security analyses of the IT system, which may lead to architecture and design tradeoffs during system development.
Implementation	The system security features should be configured, enabled, tested, and verified.	The risk management process supports the assessment of the system implementation against its requirements and within its modeled operational environment. Decisions regarding any risks identified must be made prior to system operation.
Operations & Maintenance	The system performs its functions. Typically, the system is being modified on an ongoing basis through the addition of hardware and software and by changes to organizational processes, policies, and procedures.	Risk management activities are performed for periodic system reauthorization (or reaccreditation) or whenever major changes are made to the IT system in its operational, production environment (e.g., new system interfaces).
Disposal	This phase may involve the disposition of data, hardware, and software. Activities may include moving, archiving, discarding, or destroying data and sanitizing the hardware and software.	Risk management activities are performed for system components that will be disposed of or replaced to ensure that the hardware and software are properly disposed of, that residual data is appropriately handled, and that system migration is conducted in a secure and systematic manner.

The risk management plan needs to be constantly re-evaluated. Risks must be disposed of once they are identified and ranked; they may be mitigated, accepted, transferred, or avoided. The project manager must continually look for new risks, reassess old ones, and re-evaluate risk mitigation plans. The project manager has to make sure the right people are still assigned to mitigation actions and that the actions still make sense in the context of the latest project

developments. Risk Management should be reported as part of project status reports. This will help prompt the re-assessment process.

Refer to Section 8.3.2 for additional information on Information Systems Risk Management.

5.4. SYSTEM TESTING

The Systems Test is the developer's dry-run of the User Acceptance Testing (UAT). With QA staff observing, the developer conducts an internal test of the system from end-to-end prior to presenting the system for UAT. State technical representatives may also be in attendance. This testing includes documenting any errors, correcting them, conducting vigorous regression testing, and then retesting from end-to-end to present the State/users with the best working system possible for UAT.

5.4.1. User Acceptance Testing

User Acceptance Testing is a crucial part of the testing phase in any project. The objective of a development or transfer effort is to create a system that meets the "real life" needs of the user, not just the written functional or technical specifications. The UAT is necessary to confirm that the system does that. Testers should work with other users early in the project to define the criteria for meeting user needs, incorporate them into the acceptance Test Plan, and create detailed test scripts. These criteria should relate not only to the documented functional requirements, but also to the "usability" requirements – things like visual clarity of screens, flow, logic of navigation, and response time.

UAT should be conducted in a user environment in which simulated or real target platforms and infrastructures are used. This environment should be separate from the development and production environments, but mirror or be as identical as possible to the production environment. Typically, a separate test environment is set up for testing by developers and an additional test environment is set up for UAT. UAT should include real-life scenarios and establish error severity levels, error tracking methods, results reporting, and regression testing. The system should be tested from end-to-end, including both normal and abnormal conditions such as user mistakes. To avoid a conflict of interest, it is critical that professional development and implementation team resources do not perform UAT testing. FNS strongly recommends that State and local users participate in the UAT. State and local users who have been closely involved in development should be supplemented by others, who can approach the system without the experience or potential bias of those who are already familiar with it.

The testing methodology must be rigorous and results must be documented thoroughly. If errors are identified in the system's functionality or performance, the fixes the developer makes to the system to resolve these errors should be regression tested. Regression testing is the process that requires the users to validate that the error has been fixed and that the fix does not adversely impact the system in other ways. Only when these conditions are met can testing be considered adequate to demonstrate that the system is ready for pilot. Once UAT is executed, an acceptance or "go/no-go" decision is made based upon comparison of the results to the State agency's predetermined criteria.

Documentation of UAT results must be submitted to FNS for approval before a State agency can advance from UAT to pilot and continue Federal funding. Refer to 2.3.2.9 for details on what the UAT documentation should contain.

5.4.2. Pilot Testing

The goal of the Pilot Test is to achieve a high probability that the implemented system will meet IAPD objectives. The Pilot Test is a key milestone in project development and occurs when a fully functional prototype system is available for testing, but before statewide implementation. Pilot is the best opportunity to identify defects in either

the system or the implementation approach before they become costly large-scale problems. State agencies must operate pilot projects until a state of routine operation is reached with the full caseload in the pilot area. The pilot also needs to include operating all components of the system in a live environment. Keep in mind, a pilot is important for more than just providing a trial run for the computer system. It is also an opportunity for State agencies to determine and ensure that that all parties (e.g. recipients and State/local staff) can successfully navigate the system, the State agency's approach to training is effective, and any program and system interfaces are effective.

Sufficient time must be built into the pilot to thoroughly test all system functionality and to evaluate pilot results and seek FNS approval, prior to beginning the wider implementation of the system. FNS believes that a minimum duration of three months to pilot would permit the system to work through all functions and potential system problems. The length of the pilot may be agreed upon by the State agency and FNS to include such factors as the size of the pilot; the rate of phase-in of the pilot caseload; and the track record, if any, of the system being implemented. In addition, State agencies will continue to have latitude in choosing the pilot sites. State agencies should, however, take into consideration how well the pilot's caseload represents the demands on the fully-operational system.

When a contractor is used for system development, the contract should specify that the State agency's approval of the Pilot Test results is a condition of project continuation. This provision ensures that State agencies have control of the development process. Pilot testing may be performed by the State and/or by an independent contractor, but not the contractor developing or transferring the system, which would create a conflict of interest. Optionally, FNS may monitor the Pilot test in person to corroborate the findings of the State agency. If the State intends to use an independent contractor for testing, those roles and activities must be reflected in the Test Plan.

In planning for the Pilot Test, the State agency should ensure that the test, at a minimum, includes the following elements:

- **Performance Test**—To simulate system operation, and thereby project whether the system will meet the criteria in the IAPD for sizing, performance, and capacity
- **Systems Test**—To ensure that each component, as delivered by the contractor or State systems staff, operates in accordance with the design specifications
- **End-to-End Test**—Ensures that the interactions between each component and interface perform in accordance with the design specifications.

The Pilot Test needs to operate the entire system in a "live" environment to ensure that it will meet the objectives of the IAPD after implementation. If a legacy system exists, this test will involve parallel processing of data (e.g., calculation of benefits based on household or participant information) through the current and pilot systems, and then comparing the results.

Documentation of the pilot test results must be provided to FNS for approval before the system can be implemented more broadly and also to continue to receive Federal funding. Refer to 2.3.2.1.8 for additional details on what pilot testing documentation should contain.

FNS may also monitor Pilot activities in person to corroborate the findings of the State agency. The State agency must allow sufficient time after the Pilot period to evaluate Pilot results and secure FNS concurrence for rollout. FNS recommends reporting progress throughout the duration of the Pilot, which would enable FNS to monitor results, anticipate the success of the Pilot, and reach concurrence with the State on a go/no-go decision in a timely manner.

Although successful UAT and Pilot Test are required decision points, ‘‘go/no-go’’ points may be established at any milestone in the SDLC to assess the project status and determine if continuing to the next phase is in the best interest of the project.

5.4.3. Go/No-Go Decision Points

At any point in the SDLC, but especially before continuing to the next phase, the State or FNS may establish go/no-go decision points to assess the project status and determine if continuing is in the best interest of the project. The project should not advance to the next phase until all critical criteria are met.

Since the access of needy people to nutrition assistance is dependent upon the proper functioning of automated systems, FNS is now required to ensure that all eligibility systems are adequately reviewed and tested. This requires accountability for ensuring test results are satisfactory prior to system implementation as a condition for continued funding of the project. If a State makes a decision to proceed to the next phase of the project (a ‘‘go/no-go’’ decision point, such as testing or pilot) when significant errors have been identified but are not resolved satisfactorily to support the decision to proceed, FNS can suspend or disallow Federal funds in whole or in part until the problems are resolved.

The system Pilot test is a key milestone in project development and occurs when a fully functional prototype system is available for testing, but before statewide implementation. The Pilot needs to include operating all components of the system in a live environment. The State agency should define its own ‘‘go/no-go’’ criteria and FNS may also establish additional ‘‘go/no-go’’ criteria and decision points for continuing with system implementation of the project. Continued approval of Federal funds for implementation are conditional on the result of the Pilot.

5.4.4. System Functional Requirements Review

After the contractor has developed the system according to the requirements negotiated in the design session, and after the system has passed UAT (see Section 5.5.1), FNS may elect to conduct a System Functional Requirements Review before and/or during the initial pilot training—before the deployment of software—for several purposes:

- √ Evaluate system performance and accuracy
- √ Look for indicators of successful development
- √ Verify that functional requirements were met
- √ Ensure that all policy to be administered through the system is accurate
- √ Analyze data capture and integrity, edits, and calculations
- √ Verify that UAT was thorough and successfully completed.

FNS may conduct this review either onsite or by reviewing documentation provided by the State agency. The System Functional Requirements Review ensures the system interfaces successfully with other programs and external entities, including Electronic Benefits Transfer (EBT). Please note that this does not have to be an on-site review, because it is a review of the Functional Requirements Document (FRD) created for the project to ensure it meets all State and Federal requirements.

States are encouraged to review prototypes at various stages of development to ensure that functionality, as well as the presentation layer, is being created in a user-friendly manner.

5.4.5. FNS Post-Implementation Reviews

The APD Approval process, as described in 7 CFR 277.18 (http://www.ecfr.gov/cgi-bin/text-idx?SID=61958349b5909e9586190b85ab9dd0d2&node=20140102y1.13) of the regulations states that FNS may conduct a post-implementation review of the system once it is fully operational statewide (approximately 6 months after system deployment statewide and the initial user learning curve). FNS may conduct an onsite post-implementation review to ensure the State

5.5. QUALITY ASSURANCE AND INDEPENDENT VERIFICATION AND VALIDATION

Quality management activities play a vital role in ensuring the delivery of a system that meets the requirements and standards of the State agency. Figure 5-4 provides the definitions of quality management activities that occur during the SDLC.

Figure 5-25. Quality Management Definitions

Quality Management Definitions	
Quality Assurance (QA)	The activity of providing evidence needed to establish confidence among all concerned that quality-related activities are being performed effectively. All planned or systematic actions necessary to provide adequate confidence that a system will satisfy given requirements for quality. QA ensures the existence and effectiveness of procedures that attempt to make sure—in advance—that the expected levels of quality will be reached. QA covers all activities from design to development, testing, implementation, and documentation.
Quality Control (QC)	A procedure or set of procedures intended to ensure that a product or service adheres to a defined set of quality criteria or meets the requirements of the customer and to identify ways to eliminate causes of unsatisfactory performance. Testing is a major QC event in systems development.
Independent Verification and Validation (IV&V)	The process of employing an independent third-party who performs the verification and validation checking that a software system meets specifications and fulfills its intended purpose. It is normally part of the software testing process of a project. Verification ensures that the final product satisfies or matches the original design (low-level checking). This is done through dynamic testing. Validation checks that the product design satisfies or fits the intended usage (high-level checking). This is done through static testing and other forms of review. According to the Capability Maturity Model (CMMI-SW v1.1), "Verification confirms that work products properly reflect the requirements specified for them. In other words, verification ensures that 'you built it right.' Validation confirms that the product, as provided, will fulfill its intended use. In other words, validation ensures that 'you built the right thing.'

QA is a continuous management process that must take place throughout all phases of the project life cycle. QA is the responsibility of the State agency and may be accomplished by using State resources, but many State agencies use contractor resources to perform QA activities if State resources are not available. QA resources must be separated organizationally from the development and implementation resources for the project to provide objectivity.

The QA contractor or the State entity tasked with performing QA functions may be the best suited to support the State agency in carrying out this responsibility and establishing an effective QA process. Figure 5-5 presents some proposed responsibilities that the QA contractor or the State entity performing the QA functions may fulfill in

assisting the State agency. While the development contractor works very closely with the State, the QA entity should be more objective and empowered to point out if either party, State or contractor, is not fulfilling its responsibilities or achieving agreed upon results.

Figure 5-26. QA Responsibilities

Activity	Responsibilities
Ensure Adequate Reviews	Review all deliverables to ensure that they meet contractual requirements, as well as State expectations Verify and document that the new system adequately meets all FNS and State requirements Validate review findings with users and stakeholders Compare specifications to requirements identified in documents, such as contracts and RFPs, to ensure compliance Identify and track dependencies in deliverables to ensure thorough follow-through and completion of activities Develop system test plan in collaboration with all entities (State agency, contractors, and users) See Section 2.3.2.6. Participate in internal system tests before user acceptance testing Serve as acceptance test manager by writing and managing execution of acceptance test scripts and reports (includes managing the training for the acceptance test)
Continuously Monitor Actions and Timelines	Monitor milestone schedule, accomplishments, and timelines to ensure that project is on track Monitor and determine impact of new guidelines, requirements, and outside influences on planning and procurement processes Monitor status of key deliverables and activities Monitor costs to ensure that project stays within budget
Ensure Open and Regular Communication	Help establish robust communication processes among key stakeholders Communicate lessons learned to ensure that they are incorporated into the planning and procurement processes
Manage Risk	Identify potential areas of risk (e.g., schedule slippage, cost overruns, QA concerns, changes in resources) Develop contingency plans to address risks
Clearly Define Roles and Responsibilities	Assist State agency in clearly defining roles, responsibilities, and expectations of entities involved in the QA process, including contractors and FNS

5.5.1. Quality Assurance

QA may be performed by a QA contractor or by qualified State staff. The QA contractor must not be the same as the project management contractor just as State QA staff should be independent from the project management or development staff. Implementation QA includes independent monitoring of project status indicators, such as schedules, accomplishments, deliverables, and costs. Implementation QA also incorporates formal reviews of development and implementation activities. These reviews are critical to the oversight of development projects. See the sample status report in Appendix D for an example of an implementation project plan illustrating the activities that can be monitored.

Among the FNS expectations for the development of State automation projects is that a State establish a planning and monitoring process as a condition of project approval. Contract monitoring and formal acceptance of contracted services are specific aspects of overall project monitoring. The results of State agency monitoring are reported either in the APDU or at critical junctures in project development. FNS may require specific State monitoring activities to ensure appropriate project oversight and may participate in State agency monitoring activities or conduct additional review activities at its discretion.

Reviews should be conducted periodically throughout the SDLC to gauge project progress and status.

5.5.2. Quality Control/Testing

QA should not be confused with QC. QC is a procedure or set of procedures intended to ensure that a product or service adheres to a defined set of quality criteria or meets the requirements of the customer, and it identifies ways to eliminate causes of unsatisfactory performance. QC is a role that usually resides within the IT development team. QC is similar but not identical to QA. QA is defined as a procedure or set of procedures intended to ensure that a product or service ***under development*** (before work is complete, as opposed to after it is complete) meets specified requirements. Two broad categories of QA activities are implementation QA and testing QA. QA is sometimes expressed together with QC as a single expression—QA/QC.

QC (system testing) may be performed by an independent validation and verification (Section 5.6.3) contractor. Testing QA involves independently testing the complete system (software, hardware, procedures) to determine if all stakeholders' requirements have been met.

Numerous labels are applied to the different types of testing performed during a development and implementation project. The following types of testing are performed at a minimum by development and implementation resources:

Unit Testing—Performed by the developers on either parts of or the complete system. The purpose of this testing is for the developer to eliminate component errors.

Systems Integration Testing—Performed by development team testers on a complete system in an environment matching that of production as closely as possible. The purpose of this testing is to verify the system performs as designed. Successful completion of this testing is a prerequisite for testing by QA resources.

User and pilot testing is performed only after the development and implementation resources have determined that the developed system satisfies all functional requirements, handles projected capacity demands, and performs as required by the target users.

5.5.3. Independent Verification and Validation Contractor Support

Independent Validation and Verification (IV&V) is a review process performed by an organization that is technically, managerially, and financially independent of the development organization. IV&V should not be confused with QA. FNS strongly recommends the use of IV&V to ensure a successful system test and implementation.

Verification is using iterative processes to determine whether the products produced fulfill the requirements placed on them by previous iterations/phases/steps and are internally complete, consistent, and sufficiently correct to adequately support the next iteration/phase/step.

Validation is the process of examining and exercising the complete application (software, hardware, procedures, and documentation) to determine whether all stakeholders' requirements have been met. Validation can be performed at or near the beginning of the project to ensure it is moving in a direction to eventually satisfy stakeholder needs. More commonly, validation occurs at the end of the effort to ensure the solution truly meets the latest requirements of the stakeholders (regardless of how many times these requirements may have changed during the project).

Benefits of IV&V include the following:

- √ Increased objectivity
- √ Earlier detection of errors
- √ Reduced effort and cost of removing detected errors

- √ Enhanced operational correctness
- √ Consistent development/enhancement process.

5.6. MONITORING AND OVERSIGHT

State agencies should establish and maintain detailed project schedules and frequent status reports to oversee their contractors on the project level to ensure overall program administration. FNS may require the State agency to provide contractor and project status reports for informational purposes throughout the project. These may be outlined as conditions for funding approval.

5.6.1. Status Reports

The results of State agency monitoring may be reported in routine status reports, in addition to APDUs. For management to make informed and timely decisions regarding work efforts, status reports should reasonably reflect current project performance.

Contractors are often required to provide monthly reports to the State (per the contract), that supply much of the information needed to keep FNS informed. In some cases, their reports can be forwarded directly to FNS with no additional work. However, if contractors are not providing reports, or if they do not provide the complete picture of the project's status, the State must supplement the information. Status reports need not be lengthy to be informative and meet FNS expectations. Thorough status reports may even make annual APDUs easier to compile. However, project changes that exceed program thresholds must be approved in advance by FNS through the submission of an APDU As-Needed.

When submitting status reports to FNS, State agencies should include the following information:

- √ The time period covered by the report.
- √ Narrative description of current project status.
- √ Description of activities that took place in the reporting period. Explain if activities were added or omitted from those in the approved IAPD.
- √ Areas where activities did not correspond to the project workplan.
- √ Significant accomplishments.
- √ Major deliverables received/approved.
- √ Areas where the project is behind, why, and what steps are being taken to make up time or adjust the remaining schedule.
- √ Status of previously identified problems or concerns.
- √ Newly identified problems or concerns. A contractor and the State may have a different idea of what constitutes a concern. In addition to the reports, consult FNS for guidance in resolving problems.
- √ Status of any items in the State's risk assessment that apply to this project phase.
- √ Project staffing changes.
- √ Budget—Show any known or expected variations from the approved IAPD budget in a way that FNS can see what has changed. Previous quarters should show actual costs and future quarters should show budgeted

costs.

- √ In accompanying text, explain all "significant changes."
- √ For future quarters, review all estimated costs to the budget. Show changes for all line items you anticipate will change and explain why. The most common reason would be for delays, when a cost is moved to a future quarter.
- √ Contractor bills and payments made.

Refer to Appendix E for a sample status report.

5.6.2. FNS Project Monitoring

FNS will perform monitoring of State agency projects using a variety of methods, including but not limited to, review of documents and reports, and participation in conference calls and virtual demonstrations. FNS reserves the right to conduct on-site monitoring in the form of project status visits, local and/or state agency reviews, participating in acceptance testing, and in user training.

State agencies may choose to have FNS participate as "ex-officio" members of project executive steering committees in order to obtain Federal reaction to plans and challenges at the earliest stages and also to obtain Federal buy-in when necessary. FNS may also participate as technical advisors on the project throughout the SDLC or on an as needed basis.

5.7. PROJECT CLOSEOUT

The purpose of project closeout is to assess the project and derive any lessons learned and best practices to be applied to future projects both for the individual State agency as well as for the benefit of other State agencies.

Project closeout may begin with a post-implementation review. The review may start with a survey designed to solicit feedback from the project team, end users, and other stakeholders. Once feedback has been collected and evaluated, an assessment meeting may be conducted to derive best practices and formulate lessons learned to inform future efforts. Ideally, the best practices and lessons learned should be stored in a centralized organizational repository, facilitating access and retrieval by managers of future projects.

Project closeout ends with administrative closeout—providing feedback on project team members, updating the skills inventory, capturing key project metrics, and filing all pertinent project materials into the project repository.

The elements and skills for project execution all create results that are documented during project closeout. Examples include: managing project scope, schedule, and budget result in an updated and final project schedule; monitoring and controlling risks result in an updated risk management worksheet; managing change control, deliverable acceptance, and organizational change are documented in final approval forms, issue logs, and status reports.

5.7.1. State Post-Implementation Review

A project is considered complete when it has been successfully implemented and transitioned to the responsible operational organization. At this point in the project management life cycle, the responsibilities of the project manager are to: assess how closely the project met customer needs, highlight what worked well, learn from mistakes made during the project, identify patterns and trends, derive ways to improve on processes executed throughout the project, and most importantly, communicate results. The purpose of conducting a post-implementation review is to

gather the information required to meet those responsibilities and to present the information in a post-implementation report.

Many State agencies may have a formal post-implementation review process in place. Others may use a less formal method that achieves the same results. The review has three main tasks:

- Solicit feedback
- Conduct project assessment
- Prepare post-implementation report.

The project manager should gather feedback using a survey appropriate to the project. Depending on the size and type of the project and the structure of the responsible State agency, different surveys may be required for different stakeholder groups. At a minimum, feedback should be solicited from the project sponsor (may be the director or Chief Information Officer (CIO)), project team members, and end users.

The project manager may conduct the project assessment by meeting with select members of the project team and stakeholders to present the summarized results of the feedback surveys, discuss all other aspects of the completed project, gain consensus on what was successful and what was not, and derive best practices and lessons learned.

After the project assessment, the project manager prepares a post-implementation report, which is a distillation of the information gleaned from the assessment that is organized, according to feedback categories, and has added information on key project metrics. The project manager must present or distribute the post-implementation report to members of the responsible organization and should also share it with FNS. Key areas that may be included in the report are management, risk management, communications, change management, issues management, implementation and transition, and performance of the project team.

A critical reason for the post-implementation review is to ensure that the system is reviewed and evaluated before the warranty period expires. States often tend to relax after implementation and forget that they have a limited time to identify any problems or shortcomings with the system and get them fixed during the warranty period

5.8. SUMMARY

All project staff—State and Federal—must be knowledgeable about numerous areas that are critical to IS project management and the efficient use of funds. Project team members can perform well in this essential function by keeping these tips in mind:

- √ Project Manager does no work other than managing the project. The project manager does not take on assignments or participate as a member of workgroups. The project manager's job is to keep the project on schedule, on budget, and within scope.
- √ Understand that all projects have a certain flow from beginning to end depending on the technology, culture, and personalities of critical stakeholders and be able to guide the project toward the most realistic definition of success
- √ Understand the environment in which the project will operate (project manager)
- √ Develop the requirements very carefully in order to successfully implement scope
- √ Identify the most disruptive risks and develop contingencies that eliminate or reduce consequences
- √ Spend 90 percent of his/her time communicating (project manager)

- √ Avoid unnecessary or confusing detail and clearly outline the critical path when creating the project schedule
- √ Establish the right relationships with team members and stakeholders, and a speedy issue resolution process
- √ Understand that managing the budget involves politics, as well as math
- √ Understand that the operations perspective is key to turnover of the system to the production world
- √ Be flexible, yet firm, and check egos at the door

Additional Resources

For additional information on project management, consult the FNS website (http://www.fns.usda.gov/fns) or any of the following resources:

Project Management Institute (PMI®) (http://www.pmi.org/info/default.asp)

A Guide to the Project Management Body of Knowledge (PMBOK® Guide), Project Management Institute

New York State Project Management Guidebook Release 2 (http://www.oft.state.ny.us/pmmp/guidebook2/index.htm)

North Dakota Information Technology Department, Project Management (http://www.nd.gov/itd). North Dakota Project Management Guidebooks and Templates (http://www.nd.gov/itd/standards/project-management/project-management-guidebooks-and-templates)

NIST Information Systems Guide Conducting Risk Assessments (http://csrc.nist.gov/publications/nistpubs/800-30-rev1/sp800_30_r1.pdf)

Critical Software Practices by the Software Project Managers Network (http://www.spmn.com/www2/16CSP.html)

Lientz, Bennet P., and Kathryn P. Rea. *Project Management for the 21st Century,* Academic Press, (2002).

Guidelines for Successful Acquisition and Management of Software Intensive Systems (GSAM) (http://www.stsc.hill.af.mil/resources/tech_docs/gsam4.html)

Kerzner, Harold, *Project Management: A Systems Approach to Planning, Scheduling, and Controlling*, Wiley, (2006).