U.S. Department of Education
Federal Student Aid

Lifecycle Management Methodology

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FINAL

Lifecycle Management Methodology Update History

Document Version Control

VERSION	DATE	AUTHOR	DESCRIPTION
1.0	7/29/2011	LMM Team	Initial version for publication to Intranet
1.1	10/28/2011	LMM Team	Update release to include minor corrections, synchronization with other documents, and 508 compliance (e.g., Alt Text).
1.2	6/15/2012	LMM Team	Incremental release reflecting changes needed to be consistent with version 1.2 including the updated WBS and WBS Dictionary and Tailoring Plan, the LMM Artifacts Summary and updated Library. Document was also updated to reflect the new updated Master Template. Includes minor 508 corrections.
1.3	6/30/2015	LMM Team	Incremental release reflecting changes to update WBS and WBS Dictionary and Tailoring Plan, for version 1.3.
1.4	9/30/2016	LMM Team	Minor update which included the following items: • Added guidance on incremental development (FITARA requirement) to Initative Vision and Definition Stages; • Added guidance on value engineering (OMB Circular A-131 requirement) to Definition Stage; • Removed “Lifecycle Management Methodology Stage Gate Review Process Description” document, LMM now relies on the individual process description documents maintained for each stage gate. • Updated Subject Matter Expert (SME) assignments on WBS Dictionary and Tailoring Plan and other applicable LMM SME references. Conforming changes were also made throughout the LMM documentation set to address the items above.

Table of Contents

List of Figures

List of Tables

Letter from the Acting Chief Operating Officer

Federal Student Aid Project Managers and Project Stakeholders,

Last fall, when Federal Student Aid released its Five-Year Strategic Plan, FY 2011-15, we renewed our commitment to serving our customers, students and families, by striving for operational excellence. Since that time, our organization has been working to implement the different tactics to meet our goals outlined in the Strategic Plan.

The keys to achieving these strategic goals are to ensure that Federal Student Aid aligns our priorities with the investments we make in our systems and processes, develop solutions in an effective and efficient manner, all while taking a responsible and reasonable approach to managing risk. An integral part of risk management within our project execution is ensuring that Federal Student Aid implements and adheres to a common enterprise methodology for managing, tracking, and governing projects with an IT component.

Last year, Federal Student Aid implemented the Project Management Toolkit, establishing the overall framework by which all funded projects are to be delivered. Project Managers can tailor this framework to ensure effective and reasonable process requirements for project delivery.

Today, Federal Student Aid is taking further steps to ensure more effective and responsible management of projects by implementing the Lifecycle Management Methodology, or "LMM." Effective immediately, all projects with an IT component are expected to adhere to the applicable elements and requirements of the Lifecycle Management Methodology. As a resource for any project with an IT component, the LMM adds and builds upon the standard project delivery methodology with guidance, processes, and tools that ensure appropriate and timely technology resource management throughout the project lifecycle. By having this support at logical points throughout the project, project teams can benefit from timely and effective engagement of appropriate technical resources, increasing the likelihood of avoiding unnecessary risk, costly delays, and duplications of work.

The added guidance, support, and tools that LMM brings to IT projects align with our strategic goals. I am proud to introduce the LMM and encourage you to review these methods. Together, we will work to implement these tools and processes to manage our projects that ultimately serve our customers, students and families. Thank you in advance for supporting the implementation of LMM. If you have any questions regarding LMM requirements or applicability to your project, please feel free to contact Mike Rockis at mike.rockis@ed.gov or Carole Kuriatnikova at carole.kuriatnikova@ed.gov

James Runcie
Acting Chief Operating Officer
Federal Student Aid

(Email dated June 22, 2011)

Executive Summary

The Lifecycle Management Methodology (LMM) is Federal Student Aid's (FSA) project delivery and governance methodology. All IT Projects at FSA are expected to tailor their approach to the LMM according to their project's chosen System Development Lifecycle (SDLC). While the LMM is itself not an SDLC, it does call for certain governance requirements regardless of whichever SDLC is applied to the project. Developers are expected to provide traceability of their unique SDLCs to the guidance provided by the LMM and to supplement this guidance with their own processes where appropriate.

LMM's approach to solution delivery consists of seven project stages. Depending on the size, scope and complexity of the project, some stages may be conducted iteratively. This allows for the development and delivery of solutions in smaller portions within shorter periods of time, thus emphasizing greater end user involvement. This approach offers an advantage over the single-release approach by incorporating the results of multiple rounds of user testing and acceptance of smaller, more manageable components of functionality. By involving end users throughout the lifecycle, their feedback is incorporated early and often during development, which allows the development team to take advantage of lessons learned.

The LMM focuses on delivering solution features with reasonable, evolving documentation, rather than devoting excessive amounts of time early on to comprehensive documentation that is subject to change. This minimizes the overall time and expense spent on correcting out-of-date project documentation. The intent of the LMM is not to reengineer existing processes, but rather to provide a minimum set of deliverable expectations along with a framework for aligning them.

Section 1 Introduction

1.1 Purpose

The Lifecycle Management Methodology is Federal Student Aid's project delivery and governance methodology. The LMM fosters an environment in which risks are identified and mitigated early in the lifecycle. A key to accomplishing this is the engagement of end users throughout the lifecycle.

The LMM intentionally does not recommend minimum sizes for project documentation and allows for the inclusion of additional documentation to accommodate solutions with varying cost, complexity, and time constraints. To keep documentation to a minimum, the LMM prescribes a sufficient number of artifacts, placing importance on the quality of the functional solution rather than on the number of documents created.

1.2 Scope

The LMM is FSA's project delivery and governance methodology. The LMM does not prescribe a system development lifecycle (SDLC), but the project team aligns artifacts and stage gates included in LMM with the particular SDLC that is being utilized by their project. An SDLC is a conceptual model used in project management that describes the stages involved in an information system development project, from an initial feasibility study through maintenance of the completed application. The LMM follows certain established software engineering principles. It also establishes the criteria used to determine if it is appropriate to proceed from one stage to another.

The LMM includes four components:

- a Capital Planning and Investment Control (CPIC) component;
- a project management component;
- a technology management component; and
- an acquisitions component, when an acquisition is required.

An IT Project must possess all four of these characteristics:

- Is a planned endeavor with defined start and end points having the goal of creating a unique product or service;
- The unique product or service has an IT component, as defined by the Clinger-Cohen Act of 1996, section 5002;
- Has been approved by FSA's Investment Review Board or Operating Committee; and
- Has funding OR has committed FSA resources in the way of staff hours or FSA Information Technology Infrastructure.

The Lifecycle Management Methodology applies to the development, acquisition, implementation, maintenance and disposal of IT solutions within FSA regardless of cost, complexity and time constraints. It applies to all FSA employees and contractors engaged in the development, acquisition, implementation, maintenance and disposal of FSA IT solutions. Nothing in this methodology is meant to excuse or exempt contractors from satisfying all requirements of their contracts. Even though an individual project

may not have an IT component, some aspects of LMM will apply to all projects at FSA (i.e., CPIC, project management, and potentially acquisitions). If in doubt regarding whether the LMM applies to your project, contact the LMM Team for additional guidance at LMM@ed.gov.

1.3 Intended Audience

The table below identifies the target users of the Lifecycle Management Methodology, the sections of the document most relevant for each user type, and how users may apply the guidance.

Table 1-1: Intended Audience and Document Uses

Users	Sections	Uses
• Integrated Project Teams • Subject Matter Experts • All project stakeholders	Section 2	Provides an overview of the LMM stages and the respective artifacts and processes.
• Integrated Project Teams	Section 3	Provides guidance on how the Integrated Project Team should approach the LMM Tailoring process.
• Integrated Project Teams	Appendix C	Provides some guidance on how project teams can apply their SDLC while appropriately following the LMM.

1.4 Document Organization

This document contains the following sections:

Executive Summary: Provides a high-level description of the document's purpose, scope and intended use.

Section 1– Introduction: Provides a detailed description of the document's purpose and scope, intended audience, as well as reference information.

Section 2 – Lifecycle Management Methodology Overview: This section provides a high level overview of the methodology and a detailed look at the seven stages of the LMM.

Section 3 – Tailoring Your Project: This section describes the process for tailoring your project to ensure proper documentation during the system development lifecycle.

Appendix A – Acronyms

Appendix B – Glossary

Appendix C – SDLC / LMM Engagement and Tailoring Strategies: A general guide that outlines the LMM strategies appropriate to specific SDLC approaches.

Appendix D – LMM Overview and Artifacts Slides: This appendix includes blow-ups of the LMM overview from a single and multiple release perspective along with artifacts by stage view.

1.5 LMM Stakeholder Roles and Responsibilities

The table below features a list of relevant stakeholders and presents a high-level summary of their roles vis-à-vis the LMM. A detailed description of the roles and responsibilities for each group is featured directly after the table.

Table 1-2: Stakeholder Roles and Responsibilities

Stakeholders	Roles and Responsibilities
Engineering Review Board (ERB)	A body of FSA Technology Office Executives and Directors that oversees the progress of FSA IT Projects. The ERB is particularly critical to Technical Review Stage Gates 1A and 1B.
Integrated Project Team (IPT) **Core Team Composition** • Project Owner • Program Manager • Senior Project Manager • IT Project Manager • Business Project Manager • Contracting Officer • Test Management • Technical Leads • And other key managers as defined by the project management team **Extended Team Composition** • Business Application Representative • Configuration Management • Design • Enterprise Architecture • Infrastructure • Requirements • Security • Testing	A cross-functional team consisting of individuals from the organization who are responsible for delivering a specific product such as software or a system release, and ensure project LMM compliance is planned, scheduled and maintained. In the context of this document (and FSA generally), the IPT Core Team would include individuals committed to working together on the day-to-day activities of the project. In the case of Tier 1 projects, these individuals may be assigned full time to the project. This would include a Senior PM, an IT PM from the Technology Office, a Business PM and a Contracting Officer. Normally, the Senior PM coordinates and presents at Management Review Stage Gates and the IT PM coordinates and presents at Technical Review Stage Gates. The Extended Team could include, but is not limited to, the Core Team, business application representatives, SMEs, security, testing, contractors, programmers and others who are not assigned full time but work closely with the team during all stages of the project. The TO QA Team is not included on the Extended Team because they interact with the project at key points throughout the lifecycle but not on a day-to-day basis even though they are involved during all stages of the project.
Investment Review Board (IRB)	Renders go / no-go decision for project at the Management Review Stage Gates. Has final authority over project funding and disposition.

Stakeholders	Roles and Responsibilities
LMM Tailoring Team • Quality Assurance • Enterprise Project Management and Oversight (Group) • Technology Office Project Management Office	Assists project teams tailoring LMM compliance expectations based on project size, scope and complexity. Validate LMM compliance expectations are established early for project planning, are documented and are updated as the project progresses. As needed, the SMEs will provide guidance in the development of the Lifecycle Management Methodology Work Breakdown Structure Dictionary and Tailoring Plan (LMM Tailoring Plan). Once the LMM Tailoring Plan is developed, the IPT submits the Plan to the LMM Tailoring Team for review and acceptance. Changes to the accepted plan should also be submitted to the LMM Tailoring Team using the LMM mailbox at LMM@ed.gov.
Lifecycle Management Methodology (LMM) Team	The LMM Team manages the LMM for the enterprise.
Operating Committee	Provides high level guidance and support to the Project Sponsors.
Project Sponsor	Ensures project remains in accordance with the objectives of Federal Student Aid, provides support for project among executives and stakeholders and presents investment to IRB.
Stage Gate Review Process Owner	Provides expertise in their respective area of knowledge regarding Stage Gate design and objectives. They are responsible for defining the process and communicating what activities are required to ensure successful progression through the Stage Gate.
Steering Committee	Executes detailed review of projects artifacts and overall project status during the three Management Review Stage Gates.
Subject Matter Expert (SME) (including but not limited to the following areas of expertise) • Acquisitions • Business Analysis/ Requirements Mgmt • Configuration Mgmt • Enterprise Architecture • Infrastructure • Project Management • Quality Assurance • Security • Solution Architecture/ Design • Test Management	Provides expertise, guidance and support in their respective area of knowledge to IPTs.
Technical Stage Gate Review Body	Execute detailed review of project artifacts and overall project status during the Technical Review Stage Gates.

In an iterative development environment, review bodies will participate in an initial review. Their participation regarding subsequent reviews during future iterations will be on a case-by-case-basis according to the needs and characteristics of the project.

1.5.1 Engineering Review Board

The Engineering Review Board (ERB) is an official FSA decision-making body authorized to review, assess, formulate recommendations, and approve or reject IT-related solutions. The ERB is a technical decision-making framework leveraged by FSA to enhance visibility of FSA projects with IT components allowing for more proactive planning of required IT resources across the enterprise; improve systems integration within FSA's Enterprise Architecture (EA) and within the Department's EA as applicable for initiatives that affect FSA's infrastructure; provide accelerated responses to the needs of FSA IT projects; and aid in the maturity of FSA IT practices.

Membership of the ERB is comprised of key functional and technical subject matter experts within FSA TO. Others may be solicited to provide input to ERB members and are selected based upon their ability to provide relevant information on benefits related to proposed solutions.

Chaired by the Deputy Chief Information Officer and comprised of FSA Technology Office Directors, the ERB reviews Technical Stage Gate project reviews, assessments and recommendations and votes to make project recommendations, including "go/no-go" recommendations. The ERB Chairperson, with assistance from the ERB Secretary, organizes projects that have been reviewed by the Technical Stage Gate Review Body (EITAIMG) for final review, facilitating data collection and analysis, organizing facts and findings, and making a final recommendation.

The ERB assists the FSA Technology Office and its Investment Review Board (IRB) in project level IT assessments and reviews adhering to FSA's governance of IT standards and policies, supporting leadership to deliver business value and anticipate changes to meet current and long-term needs of FSA Programs, ensuring and securing cost effective, sustainable systems to support FSA's business.

The ERB, in adherence with FSA's LMM and governance of IT standards, conducts project-level IT assessments and reviews, of and for: All Tier 1 projects as determined by ePMO; delivery of a system release or series of releases; delivery of major enhancement and/or alteration of functionality to existing systems; technical analysis and assessment efforts consisting of reports or recommendations; IT projects that are not aligned with the Target State Vision; IT projects with non-standard or technology; IT projects with high data sensitivity; IT projects with package-based customizations or custom development; IT projects that impact intricate systems; IT projects that are hosted outside of the Virtual Data Center; and Tier 1, 2 or 3 projects, as specified by the ERB.[1]

The ERB is particularly critical to Technical Review Stage Gates 1A and B and serves as the decision-making authority for these Stage Gates, for which the ERB receives the stage report / analysis from the Technical Review Stage Gate Review Body and makes a determination as to whether or not the project should continue. The IT PM working with the IPT may request or be requested to deliver project briefings to the ERB in cases involving exceptional cost or risk.

The ERB will serve as the governing body responsible for performing stage gate reviews as defined in this document and is charged with applying uniform and repeatable review practices in achieving enterprise-wide systems integration.

ERB Business Goals -

- Enhancing visibility of FSA projects with Information Technology (IT) components allowing for more proactive planning of required IT resources across the Enterprise.
- Improving systems integration within FSA's Enterprise Architecture (EA) and within the Department's Enterprise Architecture as applicable for initiatives that affect FSA's infrastructure.
- Providing accelerated responses to the needs of FSA projects with IT components.
- Aiding in the maturity of FSA IT practices.

ERB Objectives -

[1] FSA Engineering Review Board Charter dated March 2012.

- Ensuring technology scope and target solutions align with FSA's 5-Year Strategic Plan, FSA's TSV, and the tenets of FSA's EA.
- Supporting the CIO and the Technology Office in consultation with projects that require technical assistance in areas not addressed by the FSA Investment Review Board (IRB).
- Determining if a project with IT component is compliant with FSA's LMM and technical standards and guidelines.
- Communicating findings and recommendations to project team and owner. Making recommendations for further review(s).
- Providing go/no-go recommendations, based on review and assessment, to Investment Review Board (IRB), as needed.

1.5.2 Integrated Project Team

A cross-functional team consisting of individuals from the organization who are responsible for delivering a specific product (such as software, a system release, or process improvement) or service (such as a training program or externally hosted system) and ensure project LMM compliance is planned, scheduled and maintained.

PMs, including the Senior PM, the IT PM, the Business PM, and the acquisitions contracting officer or specialist, if applicable, collectively form the IPT Core Team. The Core Team is responsible for working together to manage the day-to-day activities of the project. Members of the Core Team are expected to clearly and unambiguously identify roles and responsibilities for the Core and Extended Teams at the start of the project. The Information System Security Officer (ISSO) should be identified as early as possible for IT projects. The Senior PM is responsible for coordinating the Management Review Stage Gate activities and briefing on behalf of the IPT at the review. The IT PM is responsible for working with the Stage Gate Process Owners and the IPT to develop a recommendation for the completion of the review, identifying the composition of the review team, coordinating the Technical Stage Gate Review activities and briefing on behalf of the IPT at the review.

Another key responsibility of the IPT is scheduling and coordinating the Stage Gate Reviews and ensuring project artifacts are completed and available as needed for stage gate process inputs. This role includes ensuring a balanced review occurs using the correct mix of subject matter expertise. The IPT should consider multiple discussions and meetings, if necessary, in advance of and during the review to clarify issues and facilitate a successful review that concludes with the Stage Gate Meeting.

The Extended Team would include, but is not limited to, the Core Team, business application representatives, SMEs, security, testing, contractors, programmers and others who are not assigned full time but work closely with the team during all stages of the project.

IPTs are also expected to work collaboratively and participate in meetings for critical aspects of the LMM process including Tailoring and Stage Gates.

1.5.3 Investment Review Board

The FSA Investment Review Board (IRB) approves, tracks, and reports on projects within FSA's project portfolio. The IRB is critical to the LMM because the IRB is the body that has final authority over project funding and disposition.

The core scope of the IRB's responsibility to select, control and evaluate FSA's investment portfolio in accordance with The Government Performance and Results Act (GPRA) of 1993, the Clinger-Cohen Act of 1996 and various directives and circulars issued by the Office of Management and Budget (OMB).

The scope and purpose of the IRB includes the following:

- Providing oversight of Federal Student Aid's investment management and ensure effective utilization of investment dollars and human capital;

- Overseeing investment funding decisions for all projects;
- Formally reviewing all initiatives, programs and projects (all investments);
- Allocating investment capital and operational funds;
- Optimizing efficient use of budget;
- Ensuring projects execute within organizational constraints (e.g., budget, human resource capacity, risk, enterprise architecture);
- Managing FSA's investment portfolio;
- Ensuring rigorous analysis of projects;
- Enabling strict tracking and governance of in-flight projects (funds distribution at stage gate end, change requests in excess of $50K of approved funds);
- Monitoring major operational investments, adhering to Departmental Capital Planning and Investment Control policy; and
- Issuing and enforcing standards for portfolio, program and project management.

1.5.4 LMM Team

LMM Team is responsible for maintenance and continuous improvement of the LMM and processes on behalf of the FSA enterprise. In addition the LMM Team promotes the expanding implementation of the LMM through various outreach venues.

1.5.5 LMM Tailoring Team

The LMM Tailoring Team consists of representatives from FSA Enterprise Program and Project Management and Oversight Group (ePMO), TO QA Group, and the TO Project Management Office (PMO). The LMM Tailoring Team will help PMs tailor their specific project to the LMM in a manner that best ensures the success of the project. As needed, the SMEs will provide guidance in the development of the LMM Tailoring Plan.

1.5.6 Project Sponsor

The Project Sponsor identifies a business need and is ultimately accountable for realizing the Business Case. The Project Sponsor presents at the FSA IRB and provides support for the project among executives and stakeholders. This position identifies Business and Technical leads to develop a risk profile, define and approve a project charter and establish a Business Case. The Sponsor also ensures project remains in accordance with FSA objectives.

1.5.7 Stage Gate Review Process Owner

Provide expertise, guidance and support in their respective area of knowledge to the IPTs. Stage Gate Review Process Owners are also responsible for defining the process and communicating what activities are required to ensure the IPT meets objectives resulting in the successful progression through the Stage Gate. Stage Gate Review Process Owners may be requested to present results of assessment at the Stage Gate Review Meeting.

1.5.8 Steering Committee

The Steering Committee is the review body that performs project assessments at Management Stage Gates 1, 2, and 3. This Review Body will be responsible for assuring that all project artifacts submitted by the IPT at the respective Stage Gates are accurate, assess whether or not the project continues to provide value to FSA, and make a recommendation via the Executive Sponsor and the Senior PM to the IRB regarding the future of the project.

1.5.9 Subject Matter Experts

Subject Matter Experts (SMEs) are critical to the LMM and the success of FSA Projects. As part of the LMM initiative, SMEs are process owners for their area of expertise. While serving in a key advisory role to the enterprise, SMEs are not typically members of the IPT Core or Extended Teams and perform the following:

- Provide updated templates, exemplars, and guidance documents according to the Document Configuration Management update process and schedule.
- Answer questions, and provide expert advice, assessment and guidance to IPTs during preparation for the Tailoring and Stage Gate Reviews.
- Work with IPTs to schedule reviews so that qualified resources are available. As a follow up to the Tailoring Meeting and an input to the Stage Gate Review Meetings, PMs may request a SME quality review to validate that artifacts meet minimum expectations and are technically adequate to support the next lifecycle stage.
- While the LMM ideal state is 100% review, at a minimum, compliance reviews consist of verifying the proper template was used to create a work product; verifying reasonable (based on professional judgment and Project Tier) levels of detail are captured by a work product; and applying a sampling approach to validate work product.
- May be requested to participate in Tailoring, ERB, IRB or Stage Gate Review meetings.
- Enter feedback into the Lessons Learned Database.
- Support LMM training by reviewing and commenting on curricula or materials and participating in training delivery.
- Escalate concerns related to unresolved and exceptional risk through the SMEs Director and ERB to the IRB.

1.5.10 Technical Review Stage Gate Review Body

The Technical Review Stage Gate Review Body performs project assessments in support of Technical Review Stage Gates. As a part of the assessment, the Technical Review Stage Gate Review Body evaluates risks based on a review of project artifacts submitted by the IPT, determinates whether or not the project is technically sound, and makes a recommendation for continuation into the next stage; for remediation; or in some cases may refer the project to the IRB for assessment, remediation or for termination. The composition of the body will be different for each Stage Gate depending upon the expertise required.

1.6 Authorization and Foundation

LMM is supported by Federal and Department regulations and policies. LMM's methods and processes incorporate the best practices as defined in the United States Chief Information Officer's *25 Point Implementation Plan to Reform Federal Information Technology Management*[2]. The LMM also incorporates many industry best practices and seeks to satisfy *Strategic Goal C* of the *FSA FY2012-2016*

[2] 25 Point Implementation Plan to Reform Federal Information Technology Management, The White House, US Chief Information Officer, December 9, 2010 http://www.cio.gov/documents/25-Point-Implementation-Plan-to-Reform-Federal%20IT.pdf

Five Year Plan[3]: "Develop efficient processes and effective capabilities that are among the best in the public and private sectors."

The Department of Education's LCM Directive[4] provides a baseline for all solution acquisitions across the Department. ED's LCM provides the framework to be used from the beginning stages of Planning through to Retirement. The LCM allows employees and contractors the flexibility to tailor these standard procedures to meet specific needs, but Federal Student Aid will not unilaterally change the LCM.

FSA has developed and implemented the Lifecycle Management Methodology so that it aligns with the LCM Framework. The LMM allows FSA to give specific guidance to development projects while also meeting the requirements of the LCM Framework. Development organizations are expected to fully trace their individual SDLC processes and deliverables to support the LMM where appropriate.

The following are links to Federal regulations and policies that support the use and implementation of the LMM approach:

1. Clinger-Cohen Act of 1996 (Clinger-Cohen Act)
2. Federal Information Technology Acquisition Reform Act (FITARA)
3. Office of Management and Budget (OMB) Circular A-123
4. OMB Circular A-130
5. U.S. Department of Education Investment Review Board Charter
6. U. S. Department of Education Lifecycle Management (LCM) Framework
7. FSA Engineering Review Board Charter

1.7 References and Related Documents

1.7.1 LMM SharePoint Site

https://fsa.share.ed.gov/lmm/

The SharePoint site provides project managers and other LMM stakeholders with a central location providing the latest and most up to date LMM artifacts (templates, exemplars) and associated guidance documents.

1.7.2 Documents

The documents below are appropriate references for the Lifecycle Management Methodology:

- Lifecycle Management Methodology Work Breakdown Structure Dictionary and Tailoring Plan Template
- Lifecycle Management Methodology Tailoring Plan Guidance

1.7.3 Contact Information

The LMM Team can be reached by sending an email to LMM@ed.gov.

[3] FSA FY2012-2016 Five Year Plan,

http://federalstudentaid.ed.gov/static/gw/docs/FiveYearPlan_2012.pdf

[4] Administrative Communications Systems, Departmental Directive OCIO: 1-106, July 16, 2010, http://connected.ed.gov/doc_img/acs_ocio_1_106.doc

Section 2 Lifecycle Management Methodology

2.1 LMM Overview

FSA's Lifecycle Management Methodology is designed to organize the typically large solution development process into stages that will be easier to manage and understand. The image below provides an overview of the stages of the LMM and the high-level activities that take place in each stage. See Appendix D for a larger version.

For simplicity of concept, the figure below illustrates a single release; however, it cannot cover the complexities of every conceivable SDLC approach, so it is only an example of one possible approach. In addition, how the IPT will implement the LMM will be based on the final Tailoring Plan, so one should note that there is a potential release of functionality after each build/test iteration. To see an example of what a more detailed, iterative approach might look like, see Appendix D. Appendix C provides examples of how the unique characteristics of various SDLCs may manifest themselves and how the LMM is structured to respond.

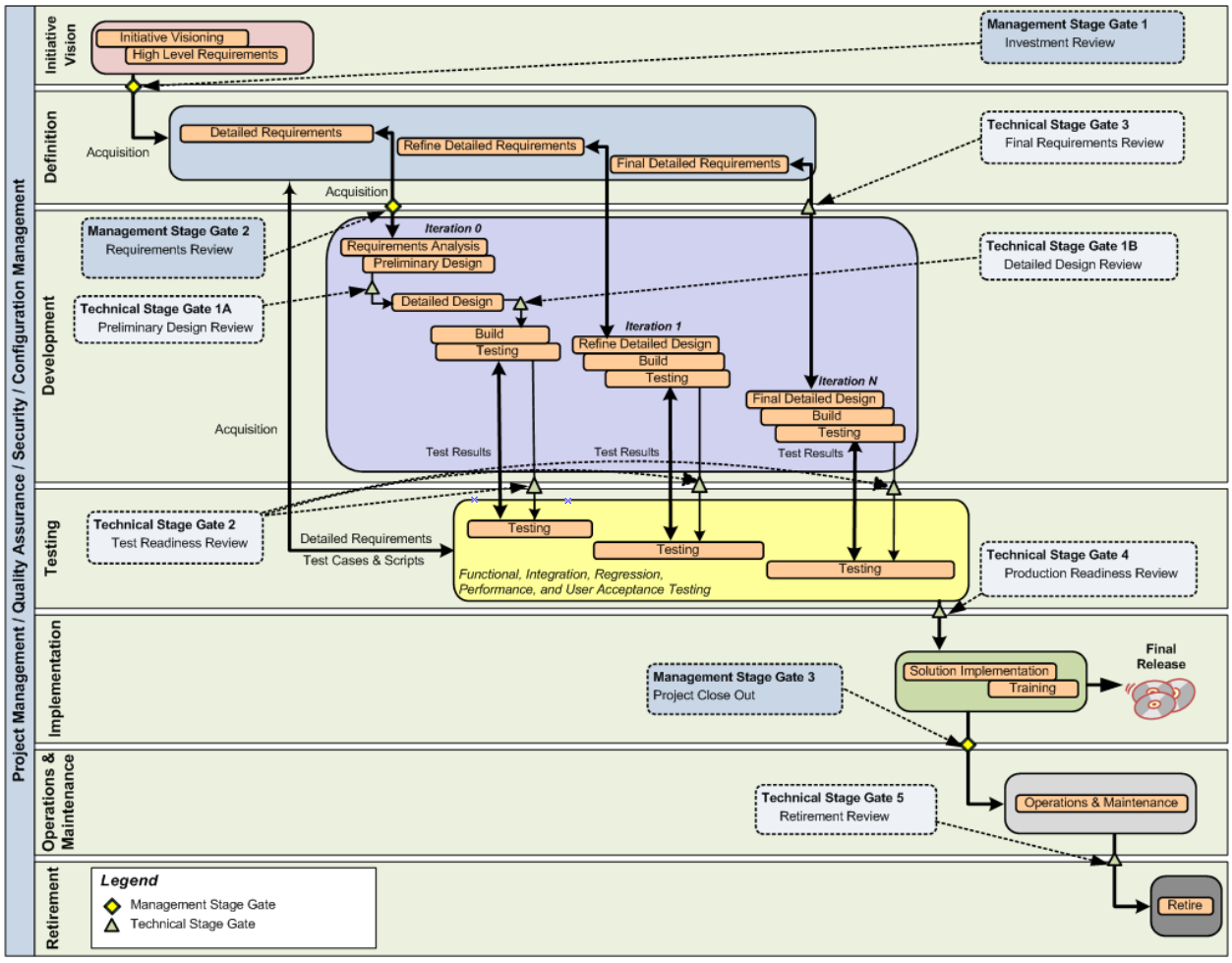


Figure 2-1: Lifecycle Management Methodology Overview

There are seven stages that take place during the lifecycle, beginning with Initiative Vision and ending with Retirement. During the development lifecycle, multiple activities take place during each stage, which are indicated in orange in the figure above.

LMM promotes an iterative development lifecycle where Definition, Development and Testing stages repeat until the developed solution fulfills end user requirements. Ideally, more easily managed solutions are developed according to requirements in a shorter time frame, bringing functionality to the end user more quickly.

LMM provides various Federal controls to support Project Managers in their efforts to monitor, report, and direct the delivery of project artifacts. Some examples include: stage gates, an enterprise work breakdown structure (WBS), a project management toolkit, templates, guidance documents, exemplars, and tailoring plans.

The LMM governance process consists of eight, general steps as outlined below:

Table 2-1: LMM 8 Process Steps

Step	Description
1	Create an LMM Tailoring Plan for the project. Using the guidance in the LMM Tailoring Plan Document, ensure that all artifacts and stage gates are addressed so that the team can refer to this document as it begins more detailed project planning.
2	Initiate discussions with SMEs and Stage Gate Process Owners to ensure draft Tailoring decisions are fully coordinated and decisions are reflected in the final Tailoring Plan submitted for approval.
3	Send the final Tailoring Plan to the LMM Tailoring Team via the LMM mailbox. Following approval, the Tailoring Plan will be posted on EEBC and a communication will be sent to the PM.
4	Ensure the project schedule reflects agreed upon Tailoring Plan artifacts and Stage Gates.
5	Prepare for Stage Gate Reviews working with Stage Gate Review Process Owners, the IPT and SMEs.
6	Prepare for the Stage Gate Review Meeting.
7	Participate in the Stage Gate Review Meeting.
8	Perform post Stage Gate Review follow-up.

2.2 LMM Artifacts Overview

Figure 2-2 below depicts the list of artifacts and maps their relevance to the specific lifecycle stages. The applicability of these artifacts to IT projects is discussed in Section 3: Tailoring Projects. It is important to note that some templates have a prescribed format that must be followed regardless of who completes it, internal or external to FSA.

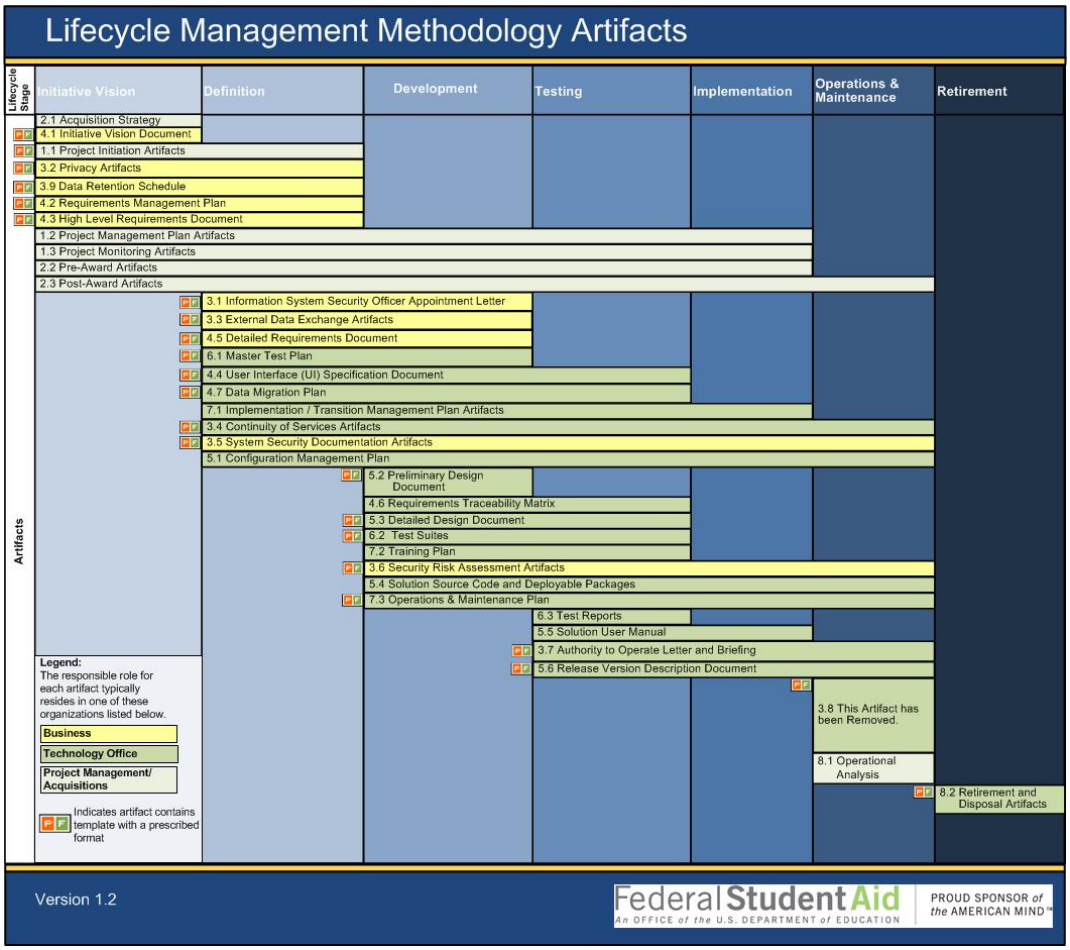


Figure 2-2: Lifecycle Management Methodology Artifacts

For a summary of the artifacts, see Appendix E. For specific information regarding each artifact, go to https://fsa.share.ed.gov/lmm/.

The activities and deliverables associated with the seven LMM stages comply with standards and processes defined by FSA's Enterprise Program Management Oversight (EPMO) Group and Technology Office (TO).

2.3 Stage Gate Overview

The Lifecycle Management Methodology approach to solution development consists of multiple project stages with a focus on incremental delivery of functionality approximately every six months. At the conclusion of each stage are established controls, called stage gates, which help ensure the project does not advance to the next stage of the project until the IPT, SMEs, stage gate process owners, and relevant governing bodies are satisfied the investment will support and add value to FSA's mission, technical flaws have been avoided, identified risks have been mitigated, the system will perform as planned, and both the project and system adhere to all appropriate regulations and standards.

Stage Gates are separated into two types, depending upon function:

- **Management Review Stage Gate:** Governance review process to minimize project risks and ensure the proper initial Investment, Requirements, and Project Close Out Reviews occur. The Investment Review ensures projects are only approved to begin if they are supported by a strong business case and support mission critical change. Requirements Review ensures project development only moves forward after sufficient requirements have been gathered and documented from business owners and future end users. Project Close Out Review ensures no project is closed without proof of sufficient documentation, and the assurance that all lifecycle development steps and activities have been completed.

- **Technical Review Stage Gate:** Governance review process to minimize project risks and ensure the proper Design, Testing, Requirements, and Production Readiness and Retirement and Disposal Reviews occur. These reviews challenge the IPTs to examine project documentation, design and functionality of the solution and ensure the project technical solution is aligned with the enterprise target state vision and architecture and are developed to meet the end user requirements as defined and approved.

For specific detailed information on the Management and Technical Review Stage Gates, refer to the process description document for each stage gate.

2.4 Initiative Vision Stage

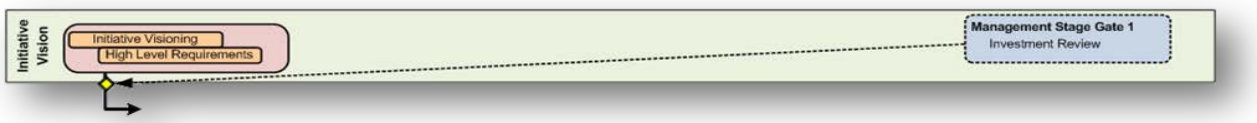


Figure 2-3: Initiative Vision Stage

Solution development begins in the *Initiative Vision* stage, which establishes project objectives, purpose, scope and high level requirements. An integrated project team (IPT) consisting of all stakeholders is established at the beginning of this stage. Each member of the team should have a clear understanding of project objectives, purpose, scope and their responsibilities for achieving them throughout the lifecycle. The general capabilities that stakeholders need and want from the ultimate solution are elicited during visioning and captured in the form of prioritized high level requirements.

The Initative Vision for FSA projects must consider and incorporate incremental development and delivery approaches. Incremental development is defined as: “For development of software or services, planned and actual delivery of new or modified technical functionality to users occurs at least every six months.” IPTs may approach incremental development differently (there is no single required SDLC by LMM); however all FSA projects must consider and incorporate incremental development approaches to achieve the goal of delivery of useful functionality to users at least every six months. Approaches that plan a single large delivery after multiple years of design, development, and testing do not meet FSA’s rapidly changing needs.

2.4.1 Key Activities of the Initiative Vision Stage

- Conduct Initiative Visioning
- Develop High Level Requirements
- Plan Project Delivery Increments and Iterations
- Plan Acquisition(s)
- Conduct High-level Evaluation of Requirements
- Draft LMM Tailoring Plan

- Review related lessons learned in the Lessons Learned Database (LLDB)

Table 2-2: Artifacts Related to the Initiative Vision Stage

New Artifacts*	Updated Artifacts
• Project Initiation Artifacts • Acquisition Strategy • Pre-Award Artifacts • Privacy Artifacts • Data Retention Schedule • Initiative Vision Document • Requirements Management Plan • High Level Requirements Document	• None

2.4.2 Initiative Vision Stage Decision Point

Management Review Stage Gate 1: Investment Review

The Investment Review Board (IRB) reviews the Initiative Vision and High Level Requirements artifacts, then either approves or rejects the project. Receiving approval to proceed to the *Definition* stage signals successful completion of this Stage Gate.

2.5 Definition Stage

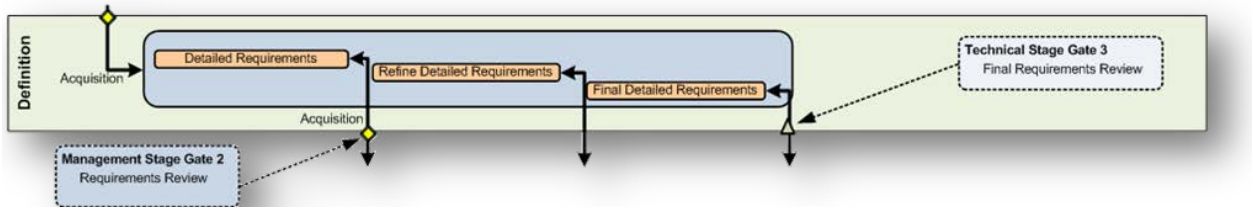


Figure 2-4: Definition Stage

In the *Definition* stage, the team develops detailed requirements based on the objectives, purpose, scope and high level requirements documented in Initiative Vision. The number of increments or iterations required to complete a project is planned during Definition Stage, and all mandatory regulatory requirements such as Security, Section 508 and IPv6 compliance are added to the detailed requirements documentation.

During the Definition Stage, the IPT carries forward the incremental development and delivery approach established during the Iniative Vision Stage. Adjustments to the incerments of requriements being deliverd may be necessary as requirements are elicited and further defined. At the conclusion of the definition stage, there should be an understanding of the planned functionality of the next build to be delivered. For projects managing many increments of development/delivery over an extended time, it is expected that the IPT will be planning ahead for the next several delivery cycles.

Value Engineering principles are also considered during the Definition Stage, particularly as part of acquisition planning and execution. OMB Circular A-131 (revised, December 26, 2013) provides an overview of these principles. Key value engineering principles for FSA projects include consideration of total lifecycle costs of systems and services, cost avoidance, best value trade-offs regarding quality and performance versus cost, and functional analysis of requirements versus the cost of meeting the

requirements. Applying value engineering prior to acquisition activities is critical to achieving savings and for FSA to make informed cost-benefit trade-off choices. The LMM does not require a specific value engineering document or analysis; however, the IPT must be able to demonstrate that value engineering has been incorporated throughout the project's planning and acquisition activities.In the first iteration, *Definition* is immediately followed by *Development* and *Testing*. In subsequent iterations, the definition stage allows users to modify requirements as necessary based on the results of testing. This promotes the incremental enhancement of solution capabilities and improvement to quality.

2.5.1 Key Activities of the Definition Stage

- Review and amend LMM Tailoring Plan (if necessary)
- Plan Project Iterations
- Detailed Requirements Elicitation
- Identify IT Infrastructure
- Plan/Conduct Acquisition(s)
- Review related lessons learned in the Lessons Learned Database (LLDB)

Table 2-3: Artifacts Related to the Definition Stage

New Artifacts*	Updated Artifacts*
• Project Management Plan Artifacts • Project Monitoring Artifacts • Post-Award Artifacts • Information System Security Officer Appointment Letter • External Data Exchange Artifacts • Continuity of Services Artifacts • System Security Documentation Artifacts • Detailed Requirements Document • User Interface (UI) Specification Document • Data Migration Plan • Configuration Management Plan • Master Test Plan • Implementation/Transition Management Plan Artifacts	• Project Initiation Artifacts • Project Management Plan Artifacts • Project Monitoring Artifacts • Pre-Award Artifacts • Post-Award Artifacts • Privacy Artifacts • Data Retention Schedule • Requirements Management Plan • High Level Requirements Document

***See WBS for sub-components of these artifacts**

2.5.2 Definition Stage Decision Points

Management Review Stage Gate 2: Requirements Review

Drafts of the representative artifacts mentioned above are produced and delivered to the stakeholders for review after the first requirements iteration. These artifacts are subject to change in the following iterations.

Technical Review Stage Gate 3: Final Requirements Review

Stakeholder review and finalize the Detailed Requirements at this review.

2.6 Development Stage

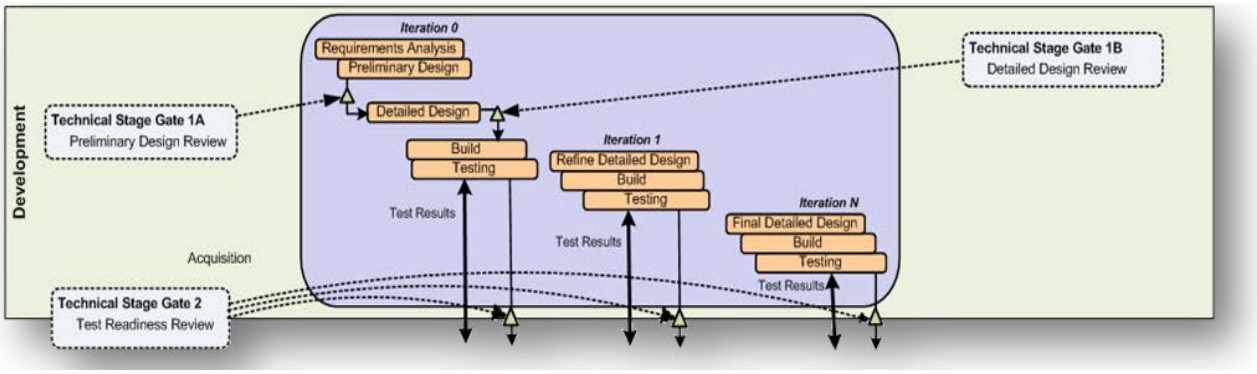


Figure 2-5: Development Stage

The *Development* stage activities consist of designing, building, testing and performing revisions and rebuilding or modifying the solution during subsequent iterations. All artifacts produced during this stage will be refined in subsequent iterations. Documents are finalized prior to commencement of the Implementation stage.

The approved *Detailed Requirements* document serves as the basis for development of the *Preliminary Design Document* and *Detailed Design Document*. All pertinent stakeholders thoroughly review these design documents, the output of which is an approved *Detailed Design* as a result of the *Technical Review Stage Gate 1B*. The validated *Detailed Design* is used to complete the first Build step, during which developers create actual functionality for the first iteration of the solution.

The team that completes the build ties progress towards the functionality of the ultimate solution by completing a *Requirements Traceability Matrix*. Preliminary testing ensures that the iteration performs according to the *Detailed Design* before the project approaches the second *Technical Stage Gate*.

2.6.1 Key Activities of the Development Stage

- Review and amend LMM Tailoring Plan (if necessary)
- Analyze Requirements
- Design, Build, & Test Solution
- Develop Requirements Traceability Matrix
- Review Code
- Administer Acquisition(s)

- Review related lessons learned in the Lessons Learned Database (LLDB)
- Collect new lessons learned and publish to the LLDB

Table 2-4: Artifacts Related to the Development Stage

New Artifacts*	Updated Artifacts*
• Security Risk Assessment Artifacts • Requirements Traceability Matrix • Preliminary Design Document • Detailed Design Document • Solution Source Code and Deployable Packages • Test Suites • Training Plan • Operations and Maintenance Plan	• Project Management Plan Artifacts • Project Monitoring Artifacts • Pre-Award Artifacts • Post-Award Artifacts • Information System Security Officer Appointment Letter • External Data Exchange Artifacts • Continuity of Services Artifacts • System Security Documentation Artifacts • Detailed Requirements Document • User Interface (UI) Specification Document • Data Migration Plan • Configuration Management Plan • Master Test Plan • Implementation/Transition Management Plan Artifacts

2.6.2 Technical Stage Gate 1A: Preliminary Design Review

Requirements analysis is followed by the creation of a preliminary technical design, which is submitted for review. After the Preliminary Design Document is finalized, the Technology Office will field a technical team to conduct a Technical Quality Control (TQC). The results of the TQC will be provided to the ERB for review and determination to proceed.

Technical Stage Gate 1B: Detailed Design Review

After a detailed technical design has been created, the team is ready to submit the project to *Detailed Design* review, again by the ERB. This review ensures that the solution is ready to be built. Further development of the solution is continued after the design, including stakeholder inputs. If required, the design is revisited before passing this Stage Gate.

Technical Stage Gate 2: Test Readiness Review

Once the solution has been built and gone through preliminary testing, it is ready for *Test Readiness Review,* where the Requirements Traceability Matrix and build are reviewed. The project may not proceed to the Testing stage until it has successfully passed through *Test Readiness Review*. At this point, the first iteration of Solution Development is complete and the build is handed over to the testing team.

2.7 Testing Stage

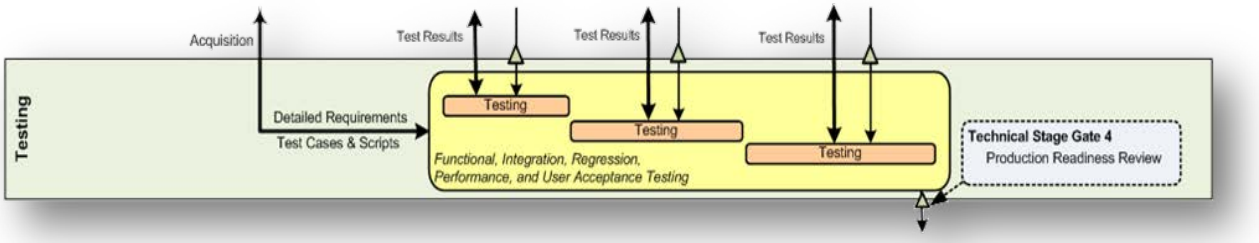


Figure 2-6: Testing Stage

The *Testing* stage activities consist of performing functional integration and performance testing. This process is repeated until the solution is determined to be ready for deployment at *Technical Stage Gate 4 – Production Readiness Review* (PRR). The results of the *Testing* stage can drive changes to the detailed requirements or the design of the solution back in the *Definition* stage, which are then incorporated into another iteration of the solution in the Development stage.

The results of functional and unit testing obtained from the *Development* stage are the baseline for further functional, regression, and performance testing activities that take place during the *Testing* stage. Any additional requirements that are identified by users and developers throughout *Testing* are included for consideration during subsequent iterations in order to improve the quality of the solution.

Inter-system and user acceptance testing are performed during final iterations. During the final testing iteration, all supporting solution development documentation from previous stages is reviewed and updated. Once final testing has concluded, the solution is released in the *Implementation* stage.

2.7.1 Key Activities of the Testing Stage

- Review and amend LMM Tailoring Plan (if necessary)
- Iterative Testing
- Functional, Integration, Regression, Performance, & User Acceptance Testing after the final iteration
- Security Reviews, Quality Assurance (QA) Testing, and Certification & Accreditation (C&A) Testing
- Review related lessons learned in the Lessons Learned Database (LLDB) during the test planning phase
- Collect new lessons learned and publish to the LLDB

Table 2-5: Artifacts Related to the Testing Stage

New Artifacts*	Updated Artifacts*
• Authority to Operate Letter and Briefing • Solution User Manual • Release Version Description Document • Test Summary Reports • Defect Management Reports	• Project Management Plan Artifacts • Project Monitoring Artifacts • Pre-Award Artifacts • Post-Award Artifacts • Continuity of Services Artifacts • System Security Documentation Artifacts • Security Risk Assessment Artifacts • User Interface (UI) Specification Document • Requirements Traceability Matrix • Data Migration Plan • Configuration Management Plan • Detailed Design Document • Solution Source Code and Deployable Packages • Test Suites • Implementation/Transition Management Plan Artifacts • Training Plan • Operations and Maintenance Plan

***See WBS for sub-components of these artifacts**

2.7.2 Testing Stage Decision Point

Technical Review Stage Gate 4: Production Readiness Review

All final artifacts are reviewed at this point. The decision is made for the solution to be implemented as-is or the project team may be requested to follow-up or make changes before the PPR is signed-off.

2.8 Implementation Stage

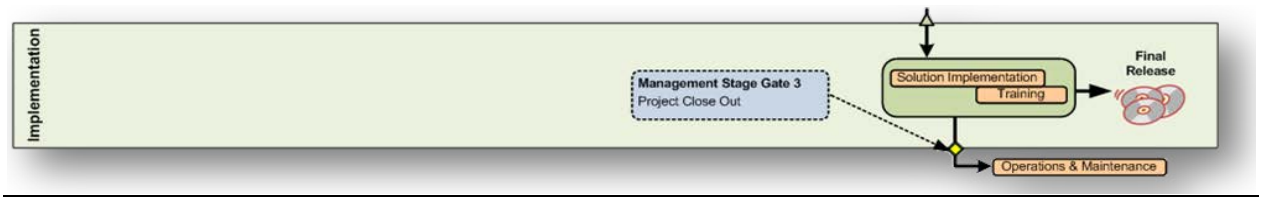


Figure 2-7: Implementation Stage

Once the solution has gone live it enters the Implementation stage, which consists of conducting security reviews, implementing the solution and training end users. During this stage, the solution is closely monitored to ensure that it functions properly and truly meets the needs of the stakeholders. The post implementation verification, final IV&V, and project close-out assessment (*Management Stage Gate 3*) serve as barometers ensuring that the solution is working properly before the project enters the *Operations & Maintenance* stage.

During *Implementation*, the *Training Plan* is employed to familiarize all end users with the new or enhanced operational solution. The solution software is installed in the production environment and made available with real data, whereupon trained users begin actively using the solution. All the solution development supporting documents are finalized during this stage.

2.8.1 Key Activities of the Implementation Stage

- Review and amend LMM Tailoring Plan (if necessary)
- Obtain Program and Technical Review
- Deploy Solution
- Review related lessons learned in the Lessons Learned Database (LLDB)
- Collect new lessons learned and publish to the LLDB

Table 2-6: Artifacts Related to the Implementation Stage

New Artifacts	Updated or Finalized Artifacts
• None	• Project Management Plan Artifacts • Project Monitoring Artifacts • Pre-Award Artifacts • Post-Award Artifacts • Continuity of Services Artifacts • System Security Documentation Artifacts • Security Risk Assessment Artifacts • Authority to Operate Letter and Briefing • Configuration Management Plan • Solution Source Code and Deployable Packages • Solution User Manual • Release Version Description Document

New Artifacts	Updated or Finalized Artifacts
	• Implementation/Transition Management Plan Artifacts • Operations and Maintenance Plan

***See WBS for sub-components of these artifacts**

2.8.2 Implementation Stage Decision Point

Management Stage Gate 3: Project Close-Out

Live batch testing is performed then project close-out activities are performed.

2.9 Operations and Maintenance Stage

Figure 2-8: Operations and Maintenance Stage

The purpose of the *Operations and Maintenance* stage is to ensure reliable operation of the solution after *Implementation*, perform scheduled and ad-hoc maintenance, and implement necessary enhancements.

Solution changes or enhancements, depending on their magnitude, may require new deliverables rather than updates to existing artifacts. The Enterprise Operational Change Management (EOCM) group performs an impact analysis prior to any production environment changes. All major changes to the solution should go through all Technical Stage Gates.

2.9.1 Key Activities of the Operations and Maintenance Stage

- Review and amend LMM Tailoring Plan (if necessary)
- Operate and manage solution
- Evaluate and enhance operations
- Conduct annual contract review
- Conduct Post Implementation Review (PIR), as necessary
- Review related lessons learned in the Lessons Learned Database (LLDB)
- Collect new lessons learned and publish to the LLDB

Table 2-7: Artifacts Related to the Operations and Maintenance Stage

New Artifacts	Updated Artifacts*
• Security, Certification and	• Post-Award Artifacts

New Artifacts	Updated Artifacts*
Accreditation and Post-Implementation Evaluation Report • Operational Analysis	• Continuity of Services Artifacts • System Security Documentation Artifacts • Security Risk Assessment Artifacts • Authority to Operate Letter and Briefing • Configuration Management Plan • Solution Source Code and Deployable Packages • Release Version Description Document • Operations and Maintenance Plan

2.10 Retirement Stage

Figure 2-9: Retirement Stage

Retirement is the final LMM stage, which consists of retiring the solution, archiving system data, and disposing of the system. The purpose of the *Retirement* stage is to execute the systematic termination of a solution and preserve vital data for future access or reactivation. In this stage, the appropriate FSA organizational units and stakeholders are actively engaged and informed of the solution's intended retirement and any interdependencies or risks.

The physical solution, its data and supporting management information must be disposed of or managed in accordance with Federal Student Aid policy in order to mitigate unnecessary costs, lapses in business information, security, privacy, and/or records risks.

2.10.1 Key Activities of the Retirement Stage

- Review and amend LMM Tailoring Plan (if necessary)
- Develop System Retirement Plan (includes shut down system or continue service decision and the data and documentation plan)
- Develop System Disposal Plan
- Dispose of system (at end of life), then archive software, data, and documentation
- Review related lessons learned in the Lessons Learned Database (LLDB)
- Collect new lessons learned and publish to the LLDB

Table 2-8: Artifacts Related to the Retirement Stage

New Artifacts Created and Finalized*	Updated Artifacts
• Retirement and Disposal Artifacts	• None

2.10.2 Retirement Stage Decision Point

Technical Stage Gate 5: Retirement Review

This is the only stage gate that occurs at the beginning of the stage, rather than at the end. The System Retirement Plan and System Disposal Plan documents are developed as the necessary outputs of this Stage Gate in order for the solution to move into the Retirement Stage. Retirement of a system will most often take place as a separate project from the one that created or updated the system in question.

Section 3 Tailoring Projects

3.1 The Tailoring Process

Federal Student Aid IT development projects must adopt the Lifecycle Management Methodology, which may be tailored as appropriate to the project and should be completed during development of the project charter, with LMM tailoring decisions captured within that charter.

In addition, along with the Tailoring Plan, the project team should submit the Investment Request (IR), the high-level project schedule, the Work Breakdown Structure (WBS) and Risk Register to the LMM Project mailbox at LMM@ed.gov. These documents constitute inputs to the Tailoring Package. Templates can be found via the LMM SharePoint Site at https://fsa.share.ed.gov/lmm.

The LMM WBS Dictionary and Tailoring Plan is an Excel-based tool to help FSA's Project Managers from the business units, the Technology Office, and the ePMO to collaboratively execute the tailoring processes for their projects. The goals of using this tool are to determine:

(1) The applicability of the LMM Artifacts to the project;

(2) How the acceptance criteria detailing the intent of that artifact will or will not be met; and

(3) Stage Gate preparation and execution and Lessons Learned activities.

Before beginning to fill in the Tailoring Plan, take a few moments to familiarize yourself with the descriptions of the various plan inputs available (see the Lifecycle Management Methodology Tailoring Guidance).

After the Tailoring Plan is completed, the assigned PM will submit it, along with the rest of the Tailoring Plan Package (i.e. Tailoring Plan, Investment Request, high-level project schedule, and Work Breakdown Structure), to the LMM Tailoring Plan Review Team at LMM@ed.gov. The review team will then schedule a meeting, during which both teams will work together to establish a final tailoring plan for the project.

A simple view of the tailoring process is shown below, followed by an explanation.

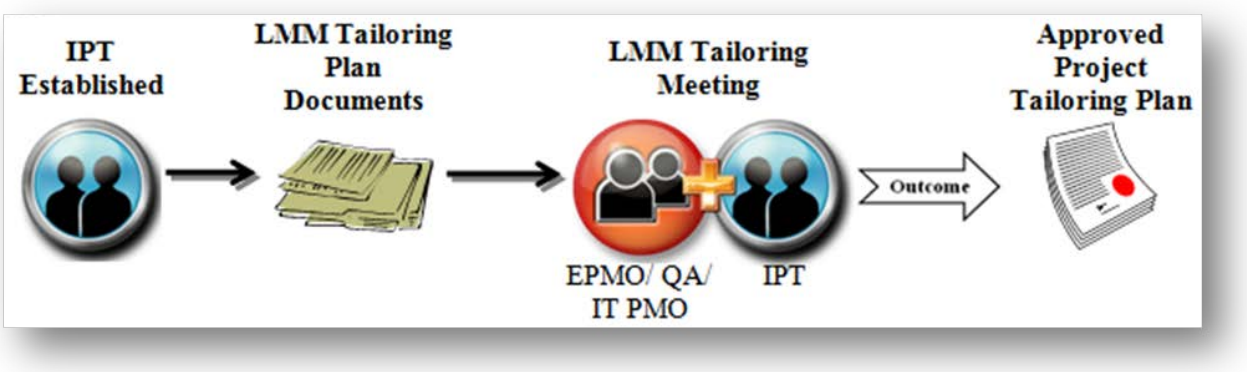


Figure 3-1: Tailoring Process

3.1.1 Step 1: Establish IPT

After a Project Manager is assigned to a project, the first step is to establish an integrated project team that can help create the foundation of a new project and lead it to a successful conclusion.

3.1.2 Step 2: Draft Tailoring Plan

Every FSA IT project is classified under one of three tiers — Simple, Standard, or Complex — based on project risk. Project teams should review risks and use the LMM Tailoring Plan Guidance (separate from this document), to define their project's tier. After a tier is established, the IPT can work toward drafting a tailoring plan for their project.

3.1.3 Step 3: Conduct an LMM Tailoring Meeting

The IPT meets with the LMM Tailoring Team (EPMO, QA, IT PMO) to go over the draft tailoring plan for the project. The goal of this discussion is to vet and finalize the tailoring plan, identify risks, and identify any risk remediation recommendations.

3.1.4 Step 4: Disseminate Approved Project Tailoring Plan

After finalizing, the IPT will distribute the Tailoring Plan to appropriate stakeholders, resulting in established LMM expectations for the project. Approved tailoring plans are then posted to SharePoint for management visibility.

Section 4. **LMM Tailoring**

4.1. **Description/Purpose**

The LMM Tailoring Process enables project teams to determine the applicability of the Enterprise Work Breakdown Structure (eWBS) artifacts to their specific project, validate the appropriate project tier (based on size, scope, and complexity risks), and prepare for Stage Gates across the project's lifecycle. This process aids project teams in establishing a baseline eWBS and Tailoring Plan ("Tailoring Plan") which notes deliverables needed to support the successful implementation of the project. Additionally, this process and its outcomes provide important insights into the planning and progress of FSA projects for various groups and governance boards within FSA.

4.2. **Roles and Responsibilities**

The table below features the key roles and responsibilities of the groups involved in the implementation of the LMM Tailoring Process.

Table 4-1: Roles and Responsibilities

STAKEHOLDER	RESPONSIBILITIES
LMM Tailoring Team	This team consists of a representative from each of the following areas: the Enterprise Project Management and Oversight Group (ePMO), the Technology Office Project Management Office, and the Technology Office Enterprise Quality and Technical Change Management Group (EQTCM). The LMM Tailoring Team is responsible for oversight, leadership, and maintenance of the LMM Tailoring Process and for working with the project teams to facilitate, review, and approve the tailoring of the Tailoring Plan for their specific projects.
LMM SMEs	The LMM SMEs, which include the owners of each Stage Gate, are integral to this process. Their areas of expertise cover project management, business analysis, requirements management, configuration management, enterprise architecture, test management, security, privacy, acquisitions, and Capital Planning and Investment Control (CPIC). These individuals provide guidance and assistance to project teams regarding the ways that they should identify artifacts and deliverables based on the specific qualities of each project.
Project Manager	This individual is responsible for developing and maintaining the Tailoring Plans for their projects. This involves both outreach and collaboration with the project sponsor or sponsoring business unit, LMM SMEs, and LMM Tailoring Team in tailoring their projects.
Integrated Project Team (IPT)	The IPT should assist the Project Manager with the development and maintenance of the project's LMM Tailoring Plan. Each IPT should also designate specific team members that will be responsible for ensuring that specific LMM artifacts on the Tailoring Plan are completed.
FSA Executives	This group encompasses both Project Sponsors and the members of the governance review boards within FSA. The current review boards that are stakeholders in this process include the Investment Review Board (IRB), the Engineering Review Board (ERB), and Operating Committee (OC). These stakeholders provide support for project adherence to the LMM.

4.3. **Tailoring Process**

In the figure and tables below, the process for progressing through LMM Tailoring is outlined. This process covers the initial submittal, definition and development, analysis, decision, and outcome stages of LMM Tailoring for a project.

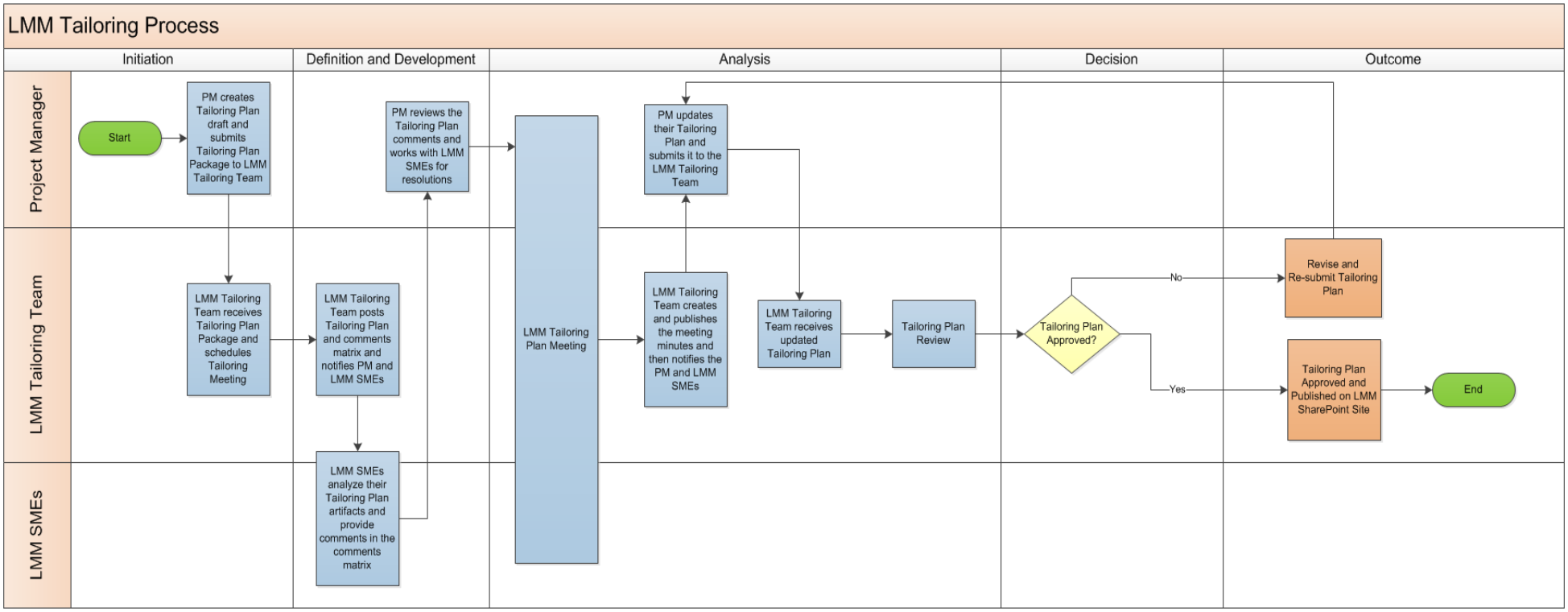


Figure 4-1: LMM Tailoring Process

Table 4-2: The Initiation Stage of the Tailoring Process

ACTIVITY	DESCRIPTION
1	**The Project Manager** • Creates their initial draft LMM Tailoring Plan, using the latest version of the Tailoring Plan Template. • Submits this draft Tailoring Plan, along with scope documentation (usually the Project Charter), together comprising the Tailoring Plan Package, to the LMM Tailoring Team through the Enterprise Project Portfolio Management (EPPM) system. Within EPPM, the project teams will submit draft Tailoring Plans through the "LMM Tailoring Plan Review" workflow. The scope documentation not already contained on the project's EPPM project site should then be emailed to the LMM Tailoring Team at LMM@ed.gov.
2	T**he LMM Tailoring Team** • Sends an acknowledgment email to the Project Manager. • Schedules an LMM Tailoring Meeting for the project within the following two weeks. The LMM SMEs, LMM Tailoring Team, and Project Manager are invited to this meeting. • Creates a comment matrix for the LMM SMEs.

Table 4-3: The Definition and Development Stage of the Tailoring Process

ACTIVITY	DESCRIPTION
3	**The LMM Tailoring Team** • Posts the comment matrix and draft LMM Tailoring Plan to the LMM Tailoring Team tab of the LMM SharePoint Site. This tab is only visible to the LMM Tailoring Team, LMM SMEs, and Project Managers of the Tailoring Plans. • Sends a notification email to the LMM SMEs and Project Manager regarding the comment matrix and draft Tailoring Plan, which includes the link to this documentation and the project's scope information.
4	**The LMM SMEs** Analyze the responses to their corresponding artifacts of the draft Tailoring Plan by the due date specified within the email from the LMM Tailoring Team. They enter their comments (including "no comments" responses) in the SME Comments column of the comments matrix.
5	**The Project Manager** Reviews the LMM SME responses and (if necessary) conducts discussions with the LMM SMEs for clarification and resolution. If specific artifacts are resolved before the Tailoring Plan Meeting through these discussions, the Project Manager will enter that information into the Resolution column of the comment matrix.

Table 4-4: The Analysis Stage of the Tailoring Process

ACTIVITY	DESCRIPTION
6	**The LMM Tailoring Team, LMM SMEs, and Project Manager** • Participate in the LMM Tailoring Plan Meeting for the project. During this meeting, the Project Manager provides an overview of the project, the LMM

ACTIVITY	DESCRIPTION
	Tailoring Team conducts a validation of the project tier designation, the Tailoring Plan comments from the LMM SMEs are discussed, and the next steps are determined.
7	**The LMM Tailoring Team** • Creates minutes of the aspects discussed during the LMM Tailoring Plan Meeting and updates the comment matrix with the resolutions that were determined within that meeting. • Publishes the minutes on the LMM Tailoring Team tab of the LMM SharePoint Site. • Sends out an email notification with the link to these minutes to the Project Manager, LMM SMEs, and the rest of the LMM Tailoring Team.
8	**The Project Manager** • Updates their draft Tailoring Plan in accordance with the aspects discussed during the LMM Tailoring Plan Meeting. • Submits their revised Tailoring Plan to the LMM Tailoring Team through the LMM mailbox at LMM@ed.gov.
9	**The LMM Tailoring Team** Provides an acknowledgment email to the Project Manager upon receipt of the updated Tailoring Plan.
10	**The LMM Tailoring Team** Reviews the updated version of this Tailoring Plan against the aspects to be updated that were captured in the Tailoring Plan Meeting minutes.

Table 4-5: The Decision Stage of the Tailoring Process

ACTIVITY	DESCRIPTION
11	**The LMM Tailoring Team** Decides whether the Tailoring Plan is approved or needs additional updates.

Table 4-6: The Outcome Stage of the Tailoring Process

ACTIVITY	DESCRIPTION
12	If additional updates are determined to be needed, the **LMM Tailoring Team** will notify the Project Manager via email. Then the **Project Manager** will further revise the Tailoring Plan and notify the LMM Tailoring Team at LMM@ed.gov when this updated Tailoring Plan is ready to be reviewed.
13	If the updated version meets the agreed upon updates listed in the minutes, then the **LMM Tailoring Team** will send an approval email to the Project Manager (and the EPPM workflow will be approved) and then publish the Tailoring Plan on the LMM Tailoring tab of the LMM SharePoint Site.

4.3.1. **Tailoring Plan Comment Resolution**

When LMM SMEs provide comments on draft Tailoring Plans, there are four main options for the Project Manager when resolving these comments. The subsequent table outlines the types of situations that would result in each specific type of resolution method.

Table 4-7: Tailoring Plan Comment Resolution

WHEN THE PROJECT MANAGER...	THEN THE TYPICAL RESOLUTION METHOD IS...
Is in **Agreement** with the comment provided for a specific artifact.	• For the Project Manager to update the Tailoring Plan accordingly.
Wants to implement **Mitigation** techniques in response to the comment for an artifact.	• To provide additional information to address the issue to the LMM SMEs and LMM Tailoring Team. After receiving this additional information, the Project Manager, along with the LMM SMEs and LMM Tailoring Team, will update the Tailoring Plan as agreed. The Project Manager will then add a statement in the project's risk log.
Acknowledges the comment for an artifact and chooses **Risk Acceptance**.	• The Tailoring Plan is updated to include any mitigation aspects that the Project Manager is planning, and the Project Manager will add the issue to the project's risk log.
Is in disagreement with the comment given for a specific artifact and wants to **Escalate** the comment to a higher authority.	• Then the Project Manager, LMM SMEs, or LMM Tailoring Team will present the issue to the issue's corresponding higher authority for resolution.

4.3.2. **Conflict of Interest Disclosure Procedures**

At times, the role of an LMM SME may conflict with their role on a specific project team that is progressing through the LMM Tailoring Process. In those cases, before the LMM Tailoring Plan Meeting is held, the LMM SME will notify the LMM Tailoring Team (through an email to LMM@ed.gov) of this conflict of interest and provide an alternate point of contact that will serve in their capacity for the duration of the Tailoring Process for that project. This alternate will be provided access to the LMM Tailoring Team tab for that duration and will be invited to the corresponding LMM Tailoring Plan Meeting.

4.4. **Process for Updates to Approved Tailoring Plans**

An approved Tailoring Plan serves as the baseline for the project. When project updates would require corresponding updates to these approved Tailoring Plans, there is a separate process for such updates. The process flow chart and table that follow outline the stages of this process.

Figure 4-2: Process for Updates to Approved Tailoring Plans

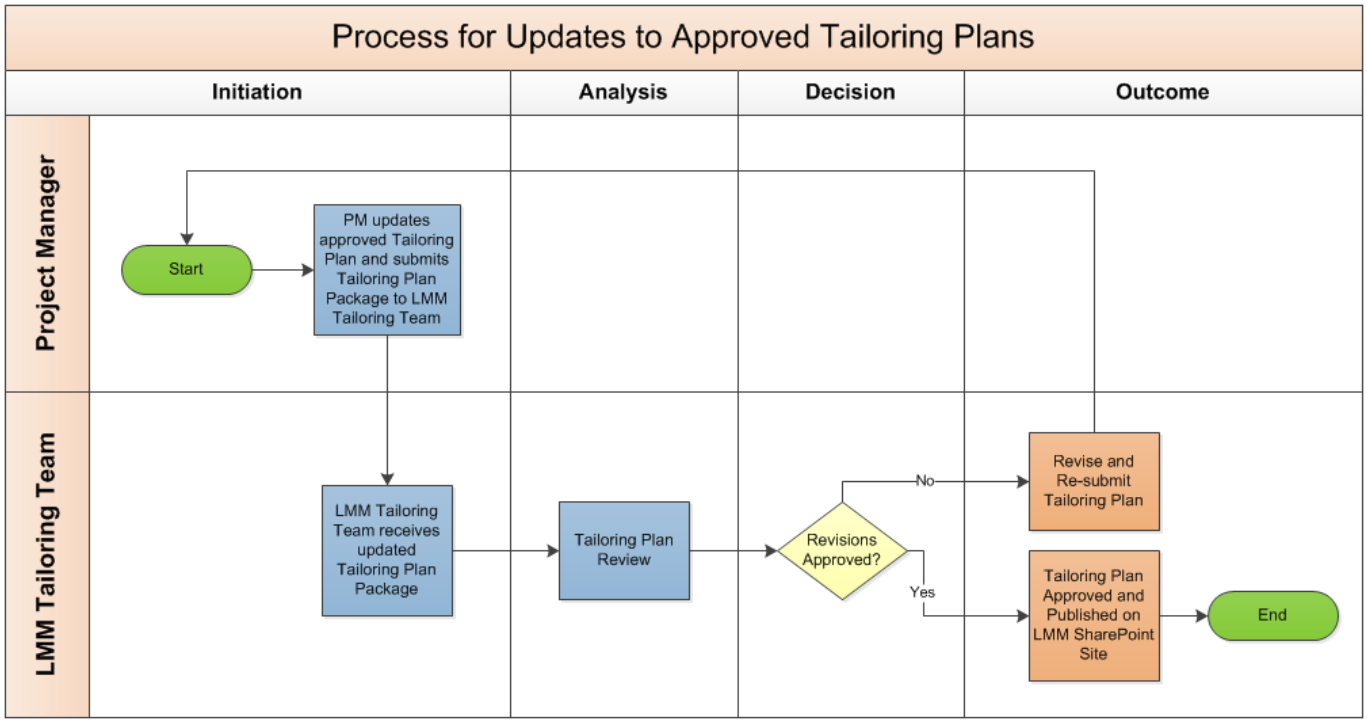


Table 4-8: Process for Updates to Approved Tailoring Plans

ACTIVITY	DESCRIPTION
1	**The Project Manager** • Initiates the process by updating the previously approved Tailoring Plan, using the latest version of the Tailoring Plan Template. If needed, this aspect may also include consultation with the appropriate LMM SMEs for specific artifacts. • Submits this updated Tailoring Plan and updated scope information (typically the Project Charter), together comprising the Tailoring Plan Package, to the LMM Tailoring Team through the LMM Mailbox at LMM@ed.gov.
2	**The LMM Tailoring Team** • Initiates their role in this process by providing an acknowledgment email to the Project Manager upon receipt of the updated Tailoring Plan.
3	**LMM Tailoring Team** • Analyzes the updated version of this Tailoring Plan against the approved version.
4	**The LMM Tailoring Team** • Decides whether the Tailoring Plan is approved or needs additional updates.
5	If additional updates are determined to be needed, the **LMM Tailoring Team** will notify the Project Manager via email. Then the **Project Manager** will further revise the Tailoring Plan and notify the LMM Tailoring Team at LMM@ed.gov when this updated Tailoring Plan is ready to be reviewed.

ACTIVITY	DESCRIPTION
6	If the updated version is determined by the LMM Tailoring Team to be sufficient, then the **LMM Tailoring Team** will send an approval email to the Project Manager and then publish the Tailoring Plan on the LMM Tailoring tab of the LMM SharePoint Site.

4.5. **Surveys of LMM SMEs and Project Managers**

The process for tailoring the Enterprise Work Breakdown Structure (eWBS) and Tailoring Plan ("Tailoring Plan") is updated on a periodic basis, mainly as a result of feedback received from its stakeholders. To that end, to actively promote the continuous improvement and customer satisfaction of this process, there will be surveys administered to both LMM SMEs and Project Managers to gauge their satisfaction levels and recommendations regarding the LMM Tailoring Process. These surveys will be conducted at a minimum on an annual basis, with ad hoc delivery (in other formats as well) at other interims (such as in a specific Monthly SME Meeting).

4.6. **Other Feedback Methods**

In addition to the survey method described, stakeholders and other FSA staff can provide feedback through directly reaching out to the LMM Tailoring Team in person, via phone, or through email at LMM@ed.gov. Feedback that would be considered a formal change request can be submitted on the LMM SharePoint Site homepage through the "Make a Recommendation?" link on the left-hand navigation bar. All feedback will be acknowledged and included in the next LMM Change Control meeting for consideration.

Appendix A. Acronyms and Abbreviations

CO	Contracting Officer
CPIC	Capital Planning and Investment Control
ED	U.S. Department of Education
EEBC	Employee Enterprise Business Collaboration
EPMO	Enterprise Project Management Oversight (Group)
EPPM	Enterprise Project Portfolio Management
eWBS	Enterprise Work Breakdown Structure
EQTCM	Enterprise Quality & Technical Change Management (Group)
ERB	Engineering Review Board
FITARA	Federal Information Technology Acquistion Reform Act
FSA	Federal Student Aid
IPT	Integrated Project Team
IRB	Investment Review Board
IT	Information Technology
IT PMO	IT Project Management Office
LCM	Lifecycle Management (Framework)
LMM	Lifecycle Management Methodology
MSG	Management Stage Gate
OC	Operating Committee
OMB	Office of Management and Budget
PM	Project Manager
PRR	Production Readiness Review
QA	Quality Assurance (Team)
SDLC	System Development Lifecycle
SIG	Strategic Investments Governance
SME	Subject Matter Expert
TO	Technology Office
TSG	Technical Stage Gate
TQC	Technical Quality Control
VE	Value Engineering
WBS	Work Breakdown Structure

Appendix B. Glossary

Term	Definition
Complex Project	A complex (tier 1) project typically crosses several functional areas, is over $1 million for a 3-year period, and meets other high risk factors.
Definition Stage	Integrated Project Team develops detailed requirements based on the objectives, purpose, scope and high level requirements documented in the Initiative Vision stage.
Development Stage	Activities consist of designing, building, testing and performing revisions and rebuilding or modifying the solution during subsequent iterations.
Employee Enterprise Business Collaboration	Intranet site that houses LMM artifacts
Engineering Review Board	A body of FSA Technology Office Executives and Directors that oversees the progress of FSA IT Projects. It is particularly critical to Technical Stage Gate 1 since the ERB receives the stage report / analysis from the Technical Stage Gate Review Body and makes a determination as to whether the project should continue.
Enterprise Project Portfolio Management (EPPM)	An enterprise-wide intranet system that streamlines FSA's project and portfolio management processes.
Enterprise Work Breakdown Structure (eWBS)	The Enterprise Work Breakdown Structure (WBS) defines the work to be completed for the project. The WBS is product-oriented, with successive levels breaking the project's end product into smaller specific elements. The lowest level is the control account or deliverable. A single control account may have multiple deliverables contained in it.
Exemplar	A sample of a completed work product template that provides a project team with sufficient information, level of detail and data organization that will meet the minimum deliverable expectations of Federal Student Aid.
Exhibit 300	Funding request document describing the business case for an investment, financials, performance measures, SRM and TRM mappings.
Incremental Developmnet	Development approach of software or services where planned and actual delivery of new or modified technical functionality to users occurs at least every six months.
Implementation Stage	Once the solution has gone live it enters the Implementation stage, which consists of conducting security reviews, implementing the solution and training end users. During this stage, the solution is closely monitored to ensure that it functions properly and truly meets the needs of the stakeholders.
Initiative Vision Stage	Establishes project objectives, purpose, scope and high level requirements.

Term	Definition
Integrated Project Team	The Senior Project Manager, IT Project Manager, Business Project Manager, and acquisitions specialist (if acquisitions are necessary) collectively form the core of the Integrated Project Team (IPT). The extended IPT consists of other project members and stakeholders.
Investment Review	Ensures projects begin only if they are supported by a strong business case and support a mission critical area.
Investment Review Board	The Investment Review Board approves, tracks, and reports on projects within FSA's project portfolio. It is critical to the LMM because it is the governing body that has ultimate control over project funding at FSA.
Lifecycle Management Methodology (LMM)	FSA's project delivery and governance methodology. It consists of seven distinct stages, each of which guides project managers through the LMM process by identifying a core/minimum set of artifacts to be created in order to ensure a project's viability.
Lifecycle Management Methodology Subject Matter Expert (LMM SME)	Provide guidance to project teams relevant to the SME's area of expertise. Before the Project Manager submits artifacts for official Stage Gate review, LMM SMEs review the artifacts and provide feedback. When requested, LMM SMEs can render project-specific analysis and expertise to the various review bodies.
Management Stage Gate	Governance process used to minimize project risk by reviewing and analyzing a project to determine if it is worthy of further effort and funding. The three Management Review Stage Gates include Investment Reviews, Requirements Reviews, and Project Close-Out Reviews.
Operations and Maintenance Stage	Ensures reliable operation of the solution after Implementation through maintenance and implementation of necessary enhancements.
Production Readiness Review	Ensures a system is ready to be deployed into a production environment.
Project	A temporary endeavor undertaken to create a unique product or service. A project has a beginning and an end. It is undertaken to achieve a strategic goal.
Project Tier	A risk-based categorization of projects based on input factors such as cost, duration, complexity, resource and procurement needs, etc. The result is one of three categories: simple (tier 3), standard (tier 2), or complex (tier 1).
Retirement Stage	Ensures that a Federal Student Aid system and system components are properly retired, decommissioned, sanitized and archived according to NIST, Department of Education and Federal Student Aid guidelines, policies standards and procedures.
SharePoint	Intranet site that houses LMM artifacts https://fsa.share.ed.gov/lmm/
Simple Project	A simple (tier 3) project typically affects a single unit within a business area, estimated to cost under $500 K, and has minimal risk.
Stage Gate	Helps ensure the solution is being developed according to requirements and that the project is properly managed and is maintaining the necessary documentation. (See Management Stage Gate and Technical Stage Gate)

Term	Definition
Standard Project	A standard (tier 2) project typically affects a single business area, is estimated to cost between $500 K – $1M, and meets other average risk factors.
Subject Matter Expert	Provide guidance to project teams relevant to the SME's area of expertise. Before the Project Manager submits artifacts for official Stage Gate review, SMEs review the artifacts and provide feedback. When requested, SMEs can render project-specific analysis and expertise to the various review bodies.
Tailoring	The PM, working with the IPT, examines risks as they plan how to complete core deliverables, or artifacts, for each project stage. The IPT captures how to address acceptance criteria for artifacts using the Work Breakdown Structure Dictionary and Tailoring Plan (Tailoring Plan). Stage Gate Reviews are also discussed during tailoring to ensure the project schedule includes planning and coordination activities needed to verify project artifacts and processes have been satisfactorily completed and are acceptable from a quality perspective before the project receives authorization to proceed from one to the next stage of development.
Tailoring Plan	An approved baseline of expectations that focus on the artifacts that an IPT will produce throughout the life of a project.
Technical Quality Control	Framework that describes the process for assuring that architectures meet the Federal Student Aid design standards.
Technical Stage Gate	Governance process used to minimize product risk by ensuring solution will perform as planned in a manner compliant with Federal regulations and standards and will not suffer from technical flaws. The five Technical Stage Gates include Design Reviews, Test Readiness Reviews, Detailed Requirements Reviews, Production Readiness Reviews, and Retirement and Disposal Reviews.
Testing Stage	Activities consist of performing functional, integration, regression, performance, and user acceptance testing.
Usable Functionality	A well-tested functional set of software code, developed incrementally, that is executable and has been successfully deployed to end-users in support of a defined set of business requirements.
Value Engineering	A systematic process of reviewing and analyzing the requirements, functions and elements of systems, project, equipment, facilities, services, and supplies for the purpose of achieving the essential functions at the lowest life-cycle cost consistent with required levels of performance, reliability, quality, or safety.

Appendix C. SDLC and Tailoring Strategies

Federal Student Aid systems cover a broad range of disciplines, staff sizes, types of development efforts, and durations. Therefore, the LMM tailoring tasks must be adaptable to match the tools and unique processes inherent in the applicable project SDLC and development environment. The specific LMM responses are in accordance with the applicable software development lifecycle stages described in the LMM. Throughout the development lifecycle stages, the Integrated Project Team (IPT) manages and controls overall system modifications, enhancements, additions, and approved changes.

The LMM plan for a specific project should be tailored for the chosen development environment. The major factors LMM will consider are lifecycle methodology, traditional versus accelerated development, centralized versus Internet development environment, and externally imposed constraints.

Lifecycles

A System Development Lifecycle (SDLC) is a conceptual model used in project management that describes the stages involved in an information system development project, from an initial feasibility study through maintenance of the completed application. A software methodology is a more detailed expression of this plan that follows certain established software engineering principles. It also establishes the criteria used to determine if it is appropriate to proceed from one task to another. The Department LCM Directive or FSA's Lifecycle Management Methodology (LMM) does not dictate the particular SDLC to be used but allows the developer to use one that is appropriate to the project as long as it satisfies the guidelines of the LMM. Federal Student Aid has further refined the Department's LCM and utilizes the LMM on projects to provide additional detail that is not defined by the LCM. It is expected that developers will provide traceability of their unique SDLCs to the guidance provided by the LMM and will supplement this guidance with their own processes where appropriate. The following section outlines the LMM strategies appropriate to specific SDLC approaches.

These should be considered as a general guide only, since it is impossible to authoritatively state that one SDLC will always be better than another. The differences between the SDLC techniques are often not as clear as the descriptions make them appear, as developers and managers may mix these approaches at some levels. These matrices highlight those LMM functions that should receive particular emphasis, but it should be noted that all LMM functions remain important, and none may be neglected.

Waterfall

In this model, the oldest and still one of most commonly used, the project proceeds through a series of separate sequential steps starting with the concept and ending with implementation. There is usually a review at the end of each step to determine if it is acceptable to proceed to the next step. If it is found that the project is not ready to proceed, the project is held in the current step until it is ready. In the pure form of this methodology, the different steps do not overlap.

Table 4-1 Waterfall

Characteristics	LMM Intent / Response
Well-defined, sequential stages characterized by clear entry/exit criteria.	LMM requires review of entry/exit criteria at boundary between stages to ensure that stage is satisfactorily completed.
Requires clear and complete documentation for each stage.	LMM ensures that documentation is clear and complete at exit from each stage.
Development team should be very familiar with technical methodologies used.	Ascertain in Initiative Vision Stage that team is experienced in tools selected for project.
Requires knowledgeable users with in-depth	Ensure that developer identifies key customers and

Characteristics	LMM Intent / Response
knowledge of system and a commitment to provide developer with support to define requirements.	conducts in-depth review sessions, Joint Application Design (JADs) to define requirements. Ascertain if developer is receiving required support from key customers with appropriate knowledge.
Requires detailed definition of requirements prior to Construction Stage.	LMM requires that requirements are sufficiently detailed before exit from Definition Stage.
Software delivered at the end of the project, so progress may not be clear.	LMM requires project IPT closely monitor the Project Work Plan and ensure that any project slippage is reported.

Modified Waterfalls

There are different versions of this technique but they may approach the problem by modifying the traditional "pure" waterfall approach by allowing the steps to overlap, reducing the documentation, and allowing more regression. Some of the more useful versions are described in the following sections.

Overlapping Waterfalls

The development stages overlap allowing discovery and insight in later stages; i.e., the requirements analysis may still be occurring partway into the Detailed Design stage. This mirrors many real-life projects.

Table 4- 2 Overlapping Waterfall

Characteristics	LMM Intent / Response
Documentation may be reduced during intermediate stages if continuity of personnel is maintained.	If personnel turnover becomes high or key personnel leave, LMM required reviews of documentation may highlight areas of uncertainty.
Requirements will probably not be completely defined until the Build portion of the Construction Stage.	LMM Requirements Traceability Matrix (RTM) may identify open requirements, partially defined requirements, and requirements not defined to appropriate level of detail. If they are not addressed at a determined point in the Construction Stage, identify them as high risk issues.
Requirements may change late in cycle.	LMM requires that changes are tracked through the CM process and that all affected code is regression tested. This may include sections of code not changed but interacting with changed code.
Milestones are more ambiguous because the clear boundary between stages is no longer available.	LMM requires stage gate identification in Project Work Plan for clear points at which progress can be checked. Project IPT monitors checkpoints and quickly report slippage from these points.

Activities being performed in parallel can lead to miscommunication, mistaken assumptions, and inefficiency.	LMM requires Federal team and IPT to work with development team to identify areas where communication problems are increasing.

Waterfall with Subprojects

The architecture is broken into logically independent subsystems that can be done separately and integrated together later in the project. This allows each subproject to proceed at its own pace rather than having to wait for all subprojects to have reached the same stage of readiness before proceeding to the next stage.

Table 4- 3 Waterfall with Subprojects

Characteristics	LMM Intent / Response
Architecture is broken into logically independent subsystems that can be done separately and integrated together later in the project.	LMM requires project IPT closely review subsystem definition, looking for unidentified interdependencies between subsystems.
Subsystems are integrated late in project.	LMM requires project IPT closely monitor testing after integration to ensure that relationships between subsystems are thoroughly tested.

Waterfall with Risk Reduction

A risk reduction spiral (see Spiral Development below) is introduced at the requirements stage and/or the architectural stage.

Table 4- 4 Waterfall with Risk Reduction

Characteristics	LMM Intent / Response
Do not have to fully understand requirements before beginning architectural design.	LMM requires project IPT ensures that a thorough review of deliverables is done at the end of each spiral iteration and that they are correct for the objectives defined at the beginning of the spiral.
Complicates management of project.	LMM requires project IPT management is closely monitoring project issues and tracking risks and mitigating strategies are identified for project risks.

Prototyping

The system concept is developed as the development team moves through the project by developing and demonstrating part of the system, usually the most visible part, to the customer. Modifications may be made and the next part is then developed based on feedback from the customer. At some point, agreement is reached between the customer and the developer that the prototype is satisfactory and outstanding work is finished and the system delivered. In some cases the prototype is disposed of and a fully functional system is developed based on the prototype successes.

Table 4- 5 Prototyping

Characteristics	LMM Intent / Response
Software is demonstrated to customer as it is developed and modified according to customer feedback.	LMM requires project IPT closely monitor for signs that project scope is growing out of bounds. There should be clear agreement at the end of each prototyping session that the system is evolving rather than simply growing. Modifications should be clearly identified and accepted by both developer and customer.
Scope of project will not be well known at beginning.	LMM requires project IPT closely track requirements to verify that they are being refined. If new requirements are identified, examine them to see if they will fit within the time and budget constraints of the project.
Requirements may change rapidly.	LMM requires project IPT closely monitor for signs that methodology is not slipping into “code and fix” mentality.

Spiral

This is a risk-oriented method that breaks a project into smaller "mini-projects." Each mini-project focuses on one or more identified major risks in a series of iterations until all risks have been addressed. Once all the risks have been addressed, the spiral model terminates the same way the waterfall model does.

Table 4- 6 Spiral

Characteristics	LMM Intent / Response
Good model for many Rapid Application Development (RAD) projects.	LMM requires project IPT examine (Initiative Vision Stage), in terms of specific project needs and point out alternative methodologies if applicable.
Complicated and requires sophisticated, experienced management and personnel.	LMM requires project IPT ensure Initiative Vision Stage, that development team has experience in, and understanding of, the Spiral approach.
Iterative, risk-oriented model.	LMM requires project IPT make certain iterations start on a small scale and build in importance. Ensure objectives, risks, and deliverables are all clearly identified in each iteration. Ensure risk-model is not used as an excuse for skipping the iteration, or iterations, necessary to establish clear requirements. Thoroughly examine iteration artifacts at the end of each iteration for indications that risks cannot be dealt with satisfactorily.

Staged / Iterative Delivery

This bears some similarities to both Prototyping and Waterfall with Subprojects in that software is demonstrated and delivered to the customer in successive stages. The steps up to and through

architectural design are the same as the Traditional Waterfall, and the following build-and-deliver steps are done for each of the separate stages. It differs from Prototyping in that the scope is established at the beginning of the project and the software is delivered in stages rather than in one package at the end as is done with the waterfall method. It differs from Waterfall with Subprojects in that the stages are delivered independently rather than integrated towards the end of the project.

Table 4- 7 Staged Delivery

Characteristics	LMM Intent / Response
Requires careful planning from both managers and technical leads.	LMM requires project IPT review stage definitions and justification carefully to verify that chosen breakdown is credible.
Interdependencies between stages must be understood.	LMM requires project IPT review stages for unidentified interdependencies. Make sure that all stages are tested as a system after delivery of the final stage.
Customers receive useful stages before the end of the project.	LMM requires project IPT review stages as they are delivered to verify that they meet user needs and are acceptable to the customer.

Hybrid Approaches

These SDLC methodologies may be combined, e.g., a spiral combined with a modified waterfall, or prototyping with Waterfall or Spiral. However, care should be taken that this is done for the purpose of improving the development process for a particular project, not for reasons of expedience. For instance, Spiral development should not be chosen under the assumption that it lessens the need for the development of requirements. The Spiral methodology differs in the manner in which and the stage at which the requirements are determined, not whether the requirements are specified and documented. The tailored LMM response to a Hybrid SDLC approach will depend on which methodologies are used.

Commercial Off-The-Shelf (COTS) Software

These are commercial software products developed to meet certain needs. These packages vary considerably in complexity and cost depending on the needs they are designed to meet. The nature of these products does not reduce the requirement for LMM compliance because they still must be integrated with other components of the target systems.

Table 4- 8 COTS Software

Characteristics	LMM Intent / Response
Will rarely satisfy all needs, especially for large, complex systems.	LMM requires project IPT at Initiative Vision Stage, carefully review capabilities of proposed software to verify that it meets minimal needs.
Immediate availability (immediacy varies depending on amount of tailoring necessary).	LMM requires project IPT determine if timetable necessary to install package will negate time gained by purchasing commercial software. Confirm by examining the experience of similar organizations.

Characteristics	LMM Intent / Response
Can be revised to meet custom needs.	LMM requires project IPT examine software capabilities in light of customer expectations to determine degree of realistic customization compared to probable customer needs for future change.

Rapid Application Development (RAD)

RAD is a term often used without being clearly defined. It may mean rapid prototyping to one user, the use of CASE tools and tight deadlines to another or a headline article in a trade journal to a third. As a useful term in a strategic sense, the best usable definition is that RAD means a project that requires an accelerated development environment compared to more traditional project modes and timelines. It requires more careful management and better understanding of the risks involved. Using this definition frees RAD of association with any one set of tools and focuses on the relationship between software development methods within specific environments especially in relation to time constraints.

There are no hard and fast rules regarding which methodology is best for RAD. There are some projects that can be developed more rapidly by a team coding in COBOL than by a team using an Object Oriented Development (OOD) approach because the OOD team may have to spend significant time defining and developing the underlying classes. Which approach to take in this example might hinge on risk factors comparing time constraints to the value of future code reuse in the given environment. The same factors affect the LMM tailoring approach taken.

Agile Development (Agile)

Agile is a lightweight software development methodology that focuses on the outcome of correct, working software over process and documentation. This methodology is highly adaptable to changing or uncertain requirements.

Agile methods break tasks into small increments with minimal planning, and do not directly involve long-term planning. Iterations are short time frames (timeboxes) that typically last from one to four weeks. Each iteration involves a team working through a full software development cycle including planning, requirements analysis, design, coding, unit testing, and acceptance testing when a working product is demonstrated to stakeholders. This is intended to minimize overall risk and allows the project to adapt to changes quickly. Stakeholders produce documentation as required. An iteration may not add enough functionality to warrant a release, but the goal is to have an available release (with minimal bugs) at the end of each iteration. Multiple iterations may be required to release a software product or new features.

The key principles of the Agile include:

- Customer satisfaction by rapid delivery of useful software
- Welcome changing requirements, even late in development
- Working software is delivered frequently (weeks rather than months)
- Working software is the principal measure of progress
- Sustainable development, able to maintain a constant pace
- Close, daily co-operation between business people and developers
- Face-to-face conversation is the best form of communication (co-location)
- Projects are built around motivated individuals, who should be trusted
- Continuous attention to technical excellence and good design
- Simplicity
- Self-organizing teams
- Regular adaptation to changing circumstances

Team composition in an agile project is usually cross-functional and self-organizing without consideration for any existing hierarchy or the corporate roles of team members. Team members normally take responsibility for tasks that deliver the functionality that an iteration requires. They decide individually how to meet each iteration's requirements.

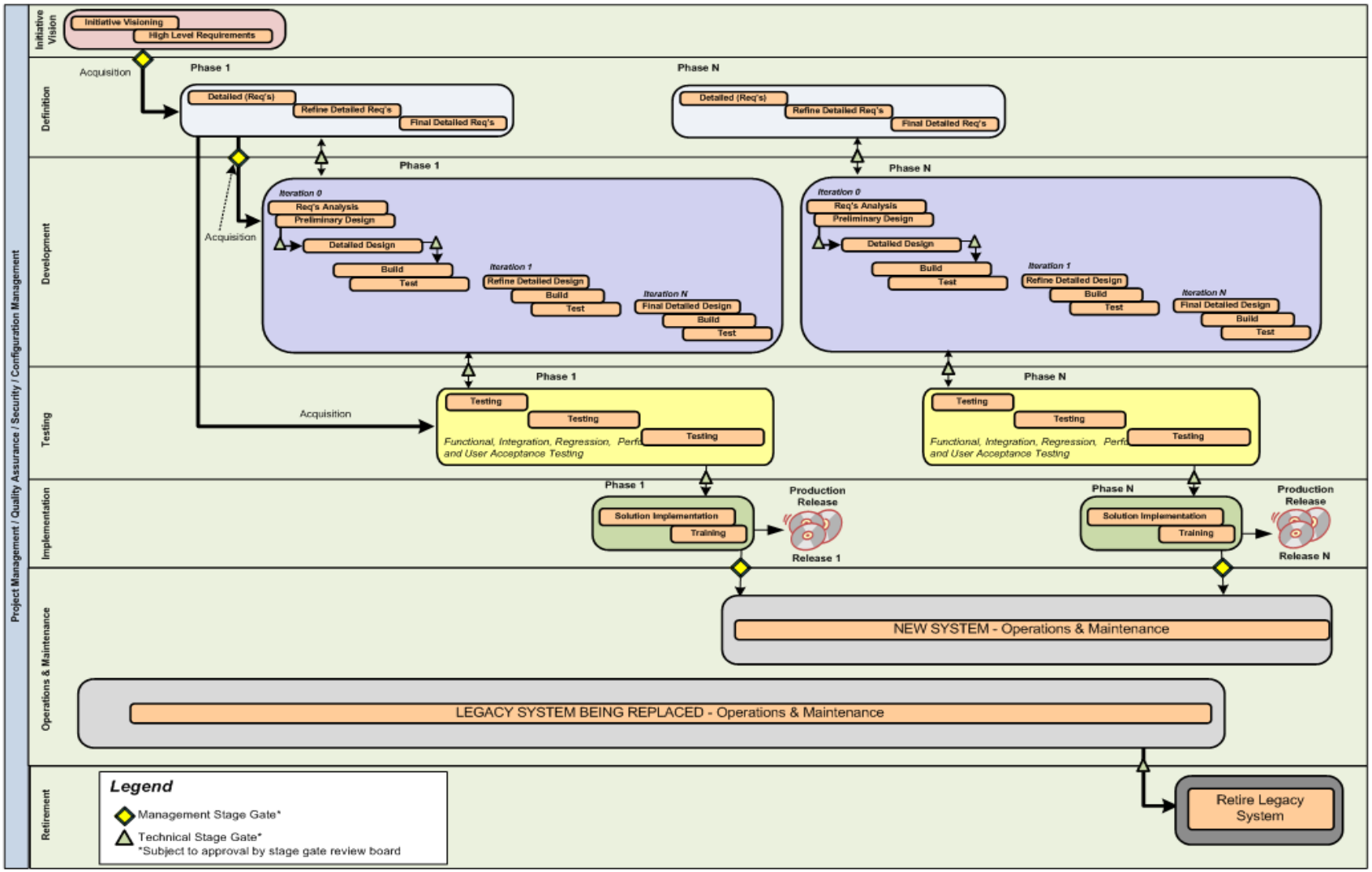
Agile emphasizes face-to-face communication over written documents when the team is all in the same location. Most agile teams work in a single open office (called a bullpen), which facilitates such communication. Team size is typically small (5-9 people) to simplify team communication and team collaboration. Larger development efforts may be delivered by multiple teams working toward a common goal or on different parts of an effort. This may require a coordination of priorities across teams. When a team works in different locations, they maintain daily contact.

Table 4-9 Agile

Characteristics	LMM Intent / Response
Individuals and interactions over processes and tools	LMM requires the project IPT to monitor individual communications and interactions to ensure that open communication is taking place.
Working software over comprehensive documentation	LMM requires the project IPT to ensure the team is producing sufficient documentation to meet Federal requirements. LMM requires Federal documentation needs are correctly articulated as part of customer requirements.
Customer collaboration over contract negotiation	LMM requires the project IPT members review the accuracy of requirements that a development team captures (format of requirements shall follow LMM tailored templates).
Responding to change over following a plan	LMM requires the IPT to increase focus on development team responses to Risk assessment and Risk Register items. Ideally Risk assessment and Risk Items are addressed during the iteration in which they are identified.

Appendix D. LMM Overview and Artifacts Slides

Federal Student Aid Lifecycle Management Methodology – Large Multi-Phase Project



Appendix E. Project Schedule Activity Lead Times & Durations

The table below provides a list of activities and ranges of lead times based on experience and history. These will assist project teams with creating project schedules that have more realistic time impacts.

Activity	Time / Timing Requirements	Description / Notes
Service Management Request Approval	2-16 weeks	Time required for approval to request VDC services. Dependencies are related to size and complexity of solution, budget approval and overall vetting and approval process
Production Readiness Review (PRR)	Pre-PRR and PRR scheduled 3 weeks in advance	Schedule PRR in Outlook using PRR distribution list, according to PRR Handbook.
508 Compliance and testing	Varies depending on the size of System/Application	Performed during the Definition, Development, and Implementation stages of the lifecycle
User Access to Department of ED and FSA Systems & Applications	Average 2-3 months (16 weeks or more, if there are complications)	Depends on level of access for new contractors. Preliminary clearance is required for SUDO or equivalent access only. If SUDO is required, contractor must be at least 6C level clearance. A 6C preliminary clearance can take up to 2-3 months (in some cases longer).
Security scans/audit findings required prior to Production	2 weeks to schedule scans; amount required to perform scan varies greatly; 30 days to resolve high criticality audit findings; 60-90 days to resolve low-medium criticality findings	Performed after base-lining each pre-preproduction environment: development, test, & staging.
System of Records Notice (SORN)	6-8 months	The SORN process is quite lengthy, and involves multiple high-level reviews from multiple offices. SORNs must also be published in the Federal Register for a 30-day public comment period before the system can go live. Note that this timeframe applies to both altered existing SORNs and new SORNs.
Performance Testing	Schedule 3 months in advance; actual testing requires 35 business days	Can be performed sequential to or in parallel with other activities

Activity	Time / Timing Requirements	Description / Notes
System Testing	Contacting testing group at beginning of project. Time required to conduct actual testing varies widely based on scope.	The Test Manager (and Test Leads in some cases) must be involved in the project from the initial project planning, through requirements definition, and the complete system design process to obtain maximum value from the formal testing activities of each project. This is an industry best practice that results in improved planning, testability of requirements, system design, and higher quality projects.
Change Control Management Change Requests	10+ days for routine changes; less than 10 days for Urgent; 1 day for Emergency	Changes and access to Development, Test, Staging and Production environments. During Peak Processing periods and Fall Conference schedules, Change Requests may be rejected, required to be rescheduled, or require Infrastructure Operations Group (IOG) management approval.
Enterprise Operational Change Management Change Requests	Open Change Requests in “draft” 6 months in advance per EOCM requirements	During Peak Processing periods and Fall Conference schedules, Change Requests to implement technical solutions may be denied or required to be rescheduled due to managing risks to system uptime.
Changes in policy and federal mandates	Based on regulatory requirements	National Institute of Standards and Technology (NIST), Federal Information Security Management (FISMA), OMB, A123, Clinger Cohen and Title IV regulation changes, etc.
Software License purchases	Based on budget and purchasing agreements	Request during the Definition stage to ensure there are no impacts to project schedules.