

Level 3 - Measurements

Level 3 measurements

The table below describes the recommended measurements in the CMM at level 3.

√	KPA	Description	References
	OPF	Measurements to determine the status of the organization's process development and improvement activities. (L3-9, M1)	
	OPD	Data on the resulting work products (from the software processes). (L3-20, A5, 1)	
	OPD	Data on the software processes. (L3-20, A5, 1)	
	OPD	Measurements to determine the status of the organization's process definition activities. (L3-22, M1)	
	TP	Measurements to determine the status of the training program activities. (L3-34, M1)	
	TP	Measurements to determine the quality of the training program. (L3-35, M2)	
	ISM	Project measurement data. (L3-39, C1, 4)	
	ISM	Process and work product measurement data. (L3-43, A2, 1.3)	
	ISM	Measurement data needed to manage the software project. (L3-44, A4, 1)	
	ISM	Software planning data, replanning data, and actual measured data. (L3-47, A5, 3)	
	ISM	Reuse measurements (reuse of requirements, design, code, test plan, and test procedures, etc.). (L3-48, A6, 3.1)	
	ISM	Measurements to determine the effectiveness of the integrated software management activities. (L3-56, M1)	
	SPE	Data on defects identified in peer reviews. (L3-78, A9)	
	SPE	Data on defects identified in testing. (L3-78, A9)	
	SPE	Measurements to determine the functionality and quality of the software products. (L3-79, M1)	
	SPE	Measurements to determine the status of the software product engineering activities. (L3-80, M2)	
	IC	Measurements to determine the status of the intergroup coordination activities. (L3-91, M1)	
	PR	Data on the conduct and results of the peer reviews. (L3-99, A3)	
	PR	Measurements to determine the status of the peer review activities. (L3-99, M1)	

Level 3 - Work Products Managed and Controlled, Continued

Level 3 work products managed and controlled, continued

The table below lists the work products that are recommended to be managed and controlled in the CMM at level 3, continued from the previous page.

√	KPA	Work Products Managed and Controlled	References
	IC	There are no work products recommended to be managed and controlled in the intergroup coordination process.	
	PR	There are no work products recommended to be managed and controlled in the peer reviews process.	

Level 3 - Work Products Managed and Controlled

Level 3 work products managed and controlled

The table below lists the work products that are recommended to be managed and controlled in the CMM at level 3.

√	KPA	Work Products Managed and Controlled	References
	OPF	There are no work products recommended to be managed and controlled in the organizational process focus process.	
	OPD	Description of the organization's standard software process.* (L3-17, A1, 9)	
	OPD	Descriptions of the software life cycles. (L3-19, A3, 4)	
	OPD	Tailoring guidelines and criteria (for the project's tailoring of the organization's standard software process. (L3-20, A4, 3)	
	OPD	Organization's software process database. (L3-21, A5, 3)	
	OPD	Library of software process-related documentation. (L3-21, A6, 6)	
	TP	The organization's training plan. (L3-31, A2, 5)	
	TP	The materials for the training courses. (L3-34, A4, 3)	
	ISM	Description of the project's defined software process. (L3-42, A1, 5)	
	ISM	Software risk management plan. (L3-54, A10, 5)	
	SPE	Tools used to develop and maintain the software products.* (L3-66, A1, 4)	
	SPE	Software requirements document.* (L3-69, A2, 11)	
	SPE	Software design document.* (L3-71, A3, 10)	
	SPE	Code.* (L3-72, A4, 5)	
	SPE	Test plans, test procedures, and test cases. (L3-74, A5, 7)	
	SPE	Test results. (L3-76, A7, 8)	
	SPE	Documentation (that will be used to operate and maintain the software). (L3-77, A8, 6)	
	SPE	Documentation tracing the allocated requirements through the software requirements, design, code, and test cases. (L3-78, A10, 3)	

*Indicates that the CMM recommends that this item must be placed under configuration management

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Level 3 - Reviews and Audits, Continued

Level 3 reviews and audits, continued

The table below lists the recommended reviews and audits in the CMM at level 3, continued from the previous page.

√	KPA	Review or Audit	Review Participants	References
	PR	The checklists are reviewed by the checklist developers' peers and potential users . (L3-98, A2, 5.2)	Checklist developers' peers Checklist potential users	
	PR	The software quality assurance group reviews and/or audits the activities and work products for peer reviews and reports the results. (L3-100, V1)	Software quality assurance group	

Level 3 - Reviews and Audits, Continued

Level 3 reviews and audits, continued

The table below lists the recommended reviews and audits in the CMM at level 3, continued from the previous page.

√	KPA	Review or Audit	Review Participants	References
	IC	The agreement for each critical dependency is documented, reviewed, and approved by both the receiving group and the group responsible for providing the critical dependency item . (L3-89, A4, 4)	Receiving group (of the critical dependency item) Group responsible for providing the critical dependency item	
	IC	Work products produced as input to other engineering groups are reviewed by representatives of the receiving groups to ensure that the work products meet their needs. (L3-90, A5)	Representatives of the receiving groups	
	IC	Representatives of the project engineering groups conduct periodic technical reviews and interchanges. (L3-90, A7)	Representatives of the project engineering groups	
	IC	The activities for intergroup coordination are reviewed with senior management on a periodic basis. (L3-91, V1)	Senior management	
	IC	The activities for intergroup coordination are reviewed with the project manager on both a periodic and event-driven basis. (L3-92, V2)	Project manager	
	IC	The software quality assurance group reviews and/or audits the activities and work products for intergroup coordination and reports the results. (L3-92, V3)	Software quality assurance group	

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Level 3 - Reviews and Audits, Continued

Level 3 reviews and audits, continued

The table below lists the recommended reviews and audits in the CMM at level 3, continued from the previous page.

√	KPA	Review or Audit	Review Participants	References
	IC	Representatives of the project's software engineering group and representatives of the other engineering groups provide the technical review and approval of the system requirements and system design. (L3-87, A2, 1.1)	Representatives of the project's software engineering group Representatives of the other engineering groups	
	IC	Representatives of the project's software engineering group and representatives of the other engineering groups provide the project-level technical review and analysis needed to manage and control changes to the system requirements and project-level objectives throughout the project's life cycle. (L3-87, A2, 1.2)	Representatives of the project's software engineering group Representatives of the other engineering groups	
	IC	Representatives of the project's software engineering group and representatives of the other engineering groups track and review the design and development activities for hardware, software, and other system components. (L3-88, A2, 1.3)	Representatives of the project's software engineering group Representatives of the other engineering groups	
	IC	The documented plan used to communicate intergroup commitments and to coordinate and track the work performed is reviewed and agreed to by all engineering groups and the project manager . (L3-89, A3, 6)	Engineering groups Project manager	

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Level 3 - Reviews and Audits, Continued

Level 3 reviews and audits, continued

The table below lists the recommended reviews and audits in the CMM at level 3, continued from the previous page.

√	KPA	Review or Audit	Review Participants	References
	SPE	The test cases are documented and are reviewed with, and approved by, the customer and end users , as appropriate, before the testing begins. (L3-76, A7, 4)	Customer End users	
	SPE	Preliminary versions of the documentation (that will be used to operate and maintain the software) are developed and made available early in the software life cycle for the customer, end users, and software maintainers , as appropriate, to review and provide feedback. (L3-77, A8, 3)	Customer End users Software maintainers	
	SPE	The documentation (that will be used to operate and maintain the software) undergoes peer review. (L3-77, A8, 5)	Not specified in the CMM	
	SPE	The final documentation (that will be used to operate and maintain the software) is reviewed and approved by the customer, end users, and software maintainers , as appropriate. (L3-77, A8, 7)	Customer End users Software maintainers	
	SPE	The activities for software product engineering are reviewed with senior management on a periodic basis. (L3-80, V1)	Senior management	
	SPE	The activities for software product engineering are reviewed with the project manager on both a periodic and event-driven basis. (L3-80, V2)	Project manager	
	SPE	The software quality assurance group reviews and/or audits the activities and work products for software product engineering and reports the results. (L3-81, V3)	Software quality assurance group	
	IC	The system requirements and project-level objectives for the project are defined and reviewed by all affected groups . (L3-84, C1, 1)	Affected groups	

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Level 3 - Reviews and Audits, Continued

Level 3 reviews and audits, continued

The table below lists the recommended reviews and audits in the CMM at level 3, continued from the previous page.

√	KPA	Review or Audit	Review Participants	References
	SPE	The software design document undergoes peer review before the design is considered complete. (L3-71, A3, 9)	Not specified in the CMM	
	SPE	The individuals involved in coding review the software requirements and software design to ensure that issues affecting the coding are identified and resolved. (L3-71, A4, 1)	Individuals involved in coding	
	SPE	Each code unit undergoes peer review and is unit tested before the unit is considered complete. (L3-72, A4, 4)	Not specified in the CMM	
	SPE	Testing criteria are developed and reviewed with the customer and the end users , as appropriate. (L3-72, A5, 1)	Customer End users	
	SPE	The test plan, test procedures, and test cases undergo peer review before they are considered ready for use. (L3-74, A5, 6)	Not specified in the CMM	
	SPE	The integration test cases and test procedures are reviewed with the individuals responsible for the software requirements, software design, and system and acceptance testing . (L3-75, A6, 2)	Individuals responsible for the software requirements, software design, and system and acceptance testing	
	SPE	System and acceptance testing are documented in a test plan, which is reviewed with, and approved by, the customer and end users , as appropriate. (L3-75, A7, 2)	Customer End users	

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Level 3 - Reviews and Audits, Continued

Level 3 reviews and audits, continued

The table below lists the recommended reviews and audits in the CMM at level 3, continued from the previous page.

√	KPA	Review or Audit	Review Participants	References
	SPE	The individuals involved in developing the software requirements review the allocated requirements to ensure that issues affecting the software requirements analysis are identified and resolved. (L3-66, A2, 1)	Individuals involved in developing the software requirements	
	SPE	Problems with the software requirements are identified and reviewed with the group responsible for the system requirements ; appropriate changes are made to the allocated requirements and to the software requirements. (L3-67, A2, 4.1)	Group responsible for the system requirements	
	SPE	The software requirements document undergoes peer review before it is considered complete. (L3-68, A2, 8)	Not specified in the CMM	
	SPE	The software requirements document is reviewed and approved. (L3-68, A2, 9)	Not specified in the CMM	
	SPE	The software requirements document is reviewed with the customer and end users , as appropriate. (L3-68, A2, 10)	Customer End users	
	SPE	Design criteria are developed and reviewed. (L3-69, A3, 1)	Not specified in the CMM	
	SPE	The individuals involved in the software design review the software requirements to ensure that issues affecting the software design are identified and resolved. (L3-69, A3, 2)	Individuals involved in the software design	
	SPE	The software architecture is reviewed to ensure that architecture issues affecting the software detailed design are identified and resolved. (L3-70, A3, 6)	Not specified in the CMM	

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Level 3 - Reviews and Audits, Continued

Level 3 reviews and audits, continued

The table below lists the recommended reviews and audits in the CMM at level 3, continued from the previous page.

√	KPA	Review or Audit	Review Participants	References
	ISM	When the software effort and cost status is reviewed and the estimates are revised, actual expenditures over time and against work completed are compared to the software development plan and used to refine the effort and cost estimates for remaining work. (L3-49, A7, 4)	Not specified in the CMM	
	ISM	The initial release and major revisions to the software risk management plan undergo peer review. (L3-54, A10, 4)	Not specified in the CMM	
	ISM	Risk priorities and software risk management plans are reviewed and revised at these reassessment points (at selected project milestones, at designated risk checkpoints, and during the planning of significant changes that affect the software project). (L3-55, A10, 6.1)	Not specified in the CMM	
	ISM	Reviews of the software project are periodically performed to determine the actions needed to bring the software project's performance and results in line with the current and projected needs of the business, customer, and end users, as appropriate. (L3-55, A11)	Not specified in the CMM	
	ISM	The activities for managing the software project are reviewed with senior management on a periodic basis. (L3-56, V1)	Senior management	
	ISM	The activities for managing the software project are reviewed with the project manager on both a periodic and event-driven basis. (L3-57, V2)	Project manager	
	ISM	The software quality assurance group reviews and/or audits the activities and work products for managing the software project and reports the results. (L3-57, V3)	Software quality assurance group	

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Level 3 - Reviews and Audits, Continued

Level 3 reviews and audits, continued

The table below lists the recommended reviews and audits in the CMM at level 3, continued from the previous page.

√	KPA	Review or Audit	Review Participants	References
	ISM	Waivers for deviations from contractual software process requirements are documented and are reviewed and approved by senior management and the software project's customer , as appropriate. (L3-42, A1, 4)	Senior management Customer	
	ISM	Changes derived from the following are documented and systematically reviewed: (L3-43, A2, 1) <ul style="list-style-type: none"> <input type="checkbox"/> lessons learned from monitoring the software activities of the organization's projects, <input type="checkbox"/> changes proposed by the software project, and <input type="checkbox"/> process and work product measurement data. 	Not specified in the CMM	
	ISM	Changes to the project's defined software process are reviewed and approved before they are incorporated. (L3-43, A2, 2)	Not specified in the CMM	
	ISM	Technical and management lessons learned from monitoring the activities of other projects in the organization are systematically reviewed and used to estimate, plan, track, and replan the software project. (L3-45, A4, 6)	Not specified in the CMM	
	ISM	A group that is independent of the software engineering group reviews the procedures for estimating the size of the software work products, and provides guidance in using historical data from the organization's software process database to establish credible estimates. (L3-47, A6, 1)	Group that is independent of the software engineering group	
	ISM	When the validity of a size estimate is questioned, a team of peers and experts reviews the estimate. (L3-48, A6, 1.2)	Team of peers and experts	

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Level 3 - Reviews and Audits, Continued

Level 3 reviews and audits, continued

The table below lists the recommended reviews and audits in the CMM at level 3, continued from the previous page.

√	KPA	Review or Audit	Review Participants	References
	OPD	The software quality assurance group reviews and/or audits the organization's activities and work products for developing and maintaining the organization's standard software process and related process assets and reports the results. (L3-23, V1)	Software quality assurance group	
	TP	The organization's training plan is reviewed by the affected individuals when it is initially released and whenever major revisions are made. (L3-31, A2, 4)	Affected individuals	
	TP	The materials for the training course are reviewed. (L3-33, A4, 2)	Not specified in the CMM	
	TP	The training program activities are reviewed with senior management on a periodic basis. (L3-35, V1)	Senior management	
	TP	The training program is independently evaluated on a periodic basis for consistency with, and relevance to, the organization's needs. (L3-36, V2)	Not specified in the CMM	
	TP	The training program activities and work products are reviewed and/or audited and the results are reported. (L3-36, V3)	Not specified in the CMM	
	ISM	Tailoring of the organization's standard software process for the project is reviewed by the group responsible for coordinating the organization's software process activities (e.g., software engineering process group) and approved by senior management . (L3-42, A1, 3)	Group responsible for the organization's software process activities Senior management	
	ISM	Waivers for deviations from the organization's standard software process are documented and are reviewed and approved by senior management . (L3-42, A1, 3.1)	Senior management	

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Level 3 - Reviews and Audits, Continued

Level 3 reviews and audits, continued

The table below lists the recommended reviews and audits in the CMM at level 3, continued from the previous page.

√	KPA	Review or Audit	Review Participants	References
	OPD	The descriptions of the software life cycles undergo peer review when initially documented and whenever significant changes or additions are made. (L3-19, A3, 3)	Not specified in the CMM	
	OPD	Changes proposed for the tailoring guidelines and criteria are documented, reviewed, and approved by the group responsible for the organization's software process activities (e.g., software engineering process group) before they are incorporated. (L3-20, A4, 2)	Group responsible for the organization's software process activities	
	OPD	The data entered into the (organization's software process) database are reviewed to ensure the integrity of the database contents. (L3-21, A5, 2)	Not specified in the CMM	
	OPD	Candidate (software process-related) documentation items are reviewed and appropriate items that may be useful in the future are included in the library. (L3-21, A6, 1)	Not specified in the CMM	
	OPD	Revisions made to (software process-related) documentation items currently in the library are reviewed, and the library contents are updated as appropriate. (L3-22, A6, 3)	Not specified in the CMM	
	OPD	The use of each (software process-related) documentation item is reviewed periodically, and the results are used to maintain the library contents. (L3-22, A6, 5)	Not specified in the CMM	

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Level 3 - Reviews and Audits

Level 3 reviews and audits

The table below lists the recommended reviews and audits in the CMM at level 3.

√	KPA	Review or Audit	Review Participants	References
	OPF	The plan for organizational software process development and improvement activities undergoes peer review when initially released and whenever major revisions are made. (L3-7, A2, 5)	Not specified in the CMM	
	OPF	The plan for organizational software process development and improvement activities is reviewed and agreed to by the organization's software managers and senior managers . (L3-7, A2, 6)	Software managers Senior managers	
	OPF	The activities for software process development and improvement are reviewed with senior management on a periodic basis. (L3-10, V1)	Senior management	
	OPF	Progress and status of the activities to develop and improve the software process are reviewed against the plan. (L3-10, V1, 1)	Not specified in the CMM	
	OPD	Changes proposed for the organization's standard software process are documented, reviewed, and approved by the group responsible for the organization's software process activities (e.g., software engineering process group) before they are incorporated. (L3-16, A1, 6)	Group responsible for the organization's software process activities	
	OPD	The description of the organization's standard software process undergoes peer review when initially developed and whenever significant changes or additions are made. (L3-16, A1, 8)	Not specified in the CMM	
	OPD	Changes proposed for the descriptions of software life cycles are documented, reviewed, and approved by the group responsible for the organization's software process activities (e.g., software engineering process group) before they are incorporated. (L3-18, A3, 2)	Group responsible for the organization's software process activities	

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Level 3 - Tools

Level 3 tools

The table below lists the tools recommended in the CMM for level 3.

√	KPA	Tools	References
	OPF	Tools to support the organization's software process activities. (L3-5, Ab2, 2)	
	OPD	Tools to support process development and maintenance. (L3-14, Ab1, 2)	
	OPD	State-of-the-practice software engineering tools. (L3-15, A1, 3)	
	OPD	Organization's software process database. (L3-20, A5)	
	TP	Tools to support the training program activities. (L3-28, Ab2, 2)	
	ISM	Organization's software process database. (L3-39, C1, 4)	
	SPE	Tools to build and maintain the software products. (L3-60, C1, 2)	
	SPE	Tools to support the software engineering tasks. (L3-61, Ab1, 2)	
	SPE	Software engineering tools. (L3-65, A1)	
	SPE	Tools to develop the documentation. (L3-76, A8, 1)	
	IC	Support tools used by the different engineering groups. (L3-85, Ab2)	
	PR	There are no tools specified in the peer reviews process.	

Level 3 - Training, Continued

Level 3 training, continued

The table below lists the training recommended in the CMM at level 3, continued from the previous page.

√	KPA	Training	References
	IC	All task leaders in each engineering group receive orientation in the processes, methods, and standards used by the other engineering groups. (L3-86, Ab4)	
	IC	The members of the engineering groups receive orientation in working as a team. (L3-86, Ab5)	
	PR	Peer review leaders receive required training in how to lead peer reviews. (L3-95, Ab2)	
	PR	Reviewers who participate in peer reviews receive required training in the objectives, principles, and methods of peer reviews. (L3-96, Ab3)	

Level 3 - Training

Level 3 training The table below lists the training recommended in the CMM at level 3.

√	KPA	Training	References
	OPF	Members of the group responsible for the organization's software process activities receive required training to perform these activities. (L3-5, Ab3)	
	OPF	Members of the software engineering group and other software-related groups receive orientation on the organization's software process activities and their roles in those activities. (L3-6, Ab4)	
	OPF	Training for the organization's and projects' software processes is coordinated across the organization. (L3-8, A6)	
	OPD	The individuals who develop and maintain the organization's standard software process and related process assets receive required training to perform these activities. (L3-14, Ab2)	
	TP	Training is provided to build the skill base of the organization, to fill the specific needs of the projects, and to develop the skills of individuals. (L3-26, C1, 3)	
	TP	Software managers receive orientation on the training program. (L3-29, Ab4)	
	ISM	The individuals responsible for developing the project's defined software process receive required training in how to tailor the organization's standard software process and use the related process assets. (L3-39, Ab2)	
	ISM	The software managers receive required training in managing the technical, administrative, and personnel aspects of the software project based on the project's defined software process. (L3-40, Ab3)	
	SPE	Members of the software engineering technical staff receive required training to perform their technical assignments. (L3-63, Ab2)	
	SPE	Members of the software engineering technical staff receive orientation in related software engineering disciplines. (L3-64, Ab3)	
	SPE	The project manager and all software managers receive orientation in the technical aspects of the software project. (L3-64, Ab4)	
	IC	All managers in the organization receive required training in teamwork. (L3-85, Ab3)	

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Level 3 - Procedures, Continued

Level 3 procedures, continued

The table below lists the activities that are recommended to be performed according to a documented procedure in the CMM at level 3, continued from the previous page.

√	KPA	Documented Procedures	References
	IC	Critical dependencies between engineering groups are identified, negotiated, and tracked according to a documented procedure. (L3-89, A4)	
	IC	Intergroup issues not resolvable by the individual representatives of the project engineering groups are handled according to a documented procedure. (L3-90, A6)	
	PR	Peer reviews are performed according to a documented procedure. (L3-97, A2)	

Level 3 - Procedures

Level 3 procedures

The table below lists the activities that are recommended to be performed according to a documented procedure in the CMM at level 3. Refer to the Level 3 Procedure Checklists for additional information regarding the content of each documented procedure.

√	KPA	Documented Procedures	References
	OPF	There are no activities that are recommended to be performed according to a documented procedure in the organizational process focus process.	
	OPD	The organization's standard software process is developed and maintained according to a documented procedure. (L3-15, A1)	
	TP	The organization's training plan is developed and revised according to a documented procedure. (L3-30, A2)	
	ISM	The project's defined software process is developed by tailoring the organization's standard software process according to a documented procedure. (L3-41, A1)	
	ISM	Each project's defined software process is revised according to a documented procedure. (L3-43, A2)	
	ISM	The project's software development plan, which describes the use of the project's defined software process, is developed and revised according to a documented procedure. (L3-44, A3)	
	ISM	The size of the software work products (or size of changes to the software work products) is managed according to a documented procedure. (L3-47, A6)	
	ISM	The project's software effort and costs are managed according to a documented procedure. (L3-48, A7)	
	ISM	The project's critical computer resources are managed according to a documented procedure. (L3-50, A8)	
	ISM	The critical dependencies and critical paths of the project's software schedule are managed according to a documented procedure. (L3-51, A9)	
	ISM	The project's software risks are identified, assessed, documented, and managed according to a documented procedure. (L3-52, A10)	
	SPE	There are no activities that are recommended to be performed according to a documented procedure in the software product engineering process.	

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Level 3 - Process Descriptions, Continued

SPE process description

Software Product Engineering involves performing the engineering tasks to build and maintain the software using the project's defined software process (which is described in the Integrated Software Management key process area) and appropriate methods and tools.

The software engineering tasks include analyzing the system requirements allocated to software (these system requirements are described in the Requirements Management key process area), developing the software requirements, developing the software architecture, designing the software, implementing the software in the code, integrating the software components, and testing the software to verify that it satisfies the specified requirements (i.e., the system requirements allocated to software and the software requirements).

Documentation needed to perform the software engineering tasks (e.g., software requirements document, software design document, test plan, and test procedures) is developed and reviewed to ensure that each task addresses the results of predecessor tasks and the results produced are appropriate for the subsequent tasks (including the tasks of operating and maintaining the software). When changes are approved, affected software work products, plans, commitments, processes, and activities are revised to reflect the approved changes. (L3-59)

IC process description

Intergroup Coordination involves the software engineering group's participation with other project engineering groups to address system-level requirements, objectives, and issues. Representatives of the project's engineering groups participate in establishing the system-level requirements, objectives, and plans by working with the customer and end users, as appropriate. These requirements, objectives, and plans become the basis for all engineering activities.

The technical working interfaces and interactions between groups are planned and managed to ensure the quality and integrity of the entire system. Technical reviews and interchanges are regularly conducted with representatives of the project's engineering groups to ensure that all engineering groups are aware of the status and plans of all the groups, and that system and intergroup issues receive appropriate attention.

The software-specific practices related to these engineering tasks are described in the Requirements Management and Software Product Engineering key process areas. (L3-83)

PR process description

Peer Reviews involve a methodical examination of software work products by the producers' peers to identify defects and areas where changes are needed. The specific products that will undergo a peer review are identified in the project's defined software process and scheduled as part of the software project planning activities, as described in Integrated Software Management.

This key process area covers the practices for performing peer reviews. The practices identifying the specific software work products that undergo peer review are contained in the key process areas that describe the development and maintenance of each software work product. (L3-93)

Level 3 - Process Descriptions, Continued

TP process description

Training Program involves first identifying the training needed by the organization, projects, and individuals, then developing or procuring training to address the identified needs.

Each software project evaluates its current and future skill needs and determines how these skills will be obtained. Some skills are effectively and efficiently imparted through informal vehicles (e.g., on-the-job training and informal mentoring), whereas other skills need more formal training vehicles (e.g., classroom training and guided self-study) to be effectively and efficiently imparted. The appropriate vehicles are selected and used.

This key process area covers the practices for the group performing the training function. The practices identifying the specific training topics (i.e., knowledge or skill needed) are contained in the Ability to Perform common feature of the individual key process areas. (L3-25)

ISM process description

Integrated Software Management involves developing the project's defined software process and managing the software project using this defined software process. The project's defined software process is tailored from the organization's standard software process to address the specific characteristics of the project.

The software development plan is based on the project's defined software process and describes how the activities of the project's defined software process will be implemented and managed. The management of the software project's size, effort, cost, schedule, staffing, and other resources is tied to the tasks of the project's defined software process.

Since the projects' defined software processes are all tailored from the organization's standard software process, the software projects can share process data and lessons learned.

The basic practices for estimating, planning, and tracking a software project are described in the Software Project Planning and Software Project Tracking and Oversight key process areas. They focus on recognizing problems when they occur and adjusting the plans and/or performance to address the problems. The practices of this key process area build on, and are in addition to, the practices of those two key process areas. The emphasis of Integrated Software Management shifts to anticipating problems and acting to prevent or minimize the effects of these problems. (L3-37)

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Level 3 - Process Descriptions

OPF process description

Organization Process Focus involves developing and maintaining an understanding of the organization's and projects' software processes and coordinating the activities to assess, develop, maintain, and improve these processes.

The organization provides the long-term commitments and resources to coordinate the development and maintenance of the software processes across current and future software projects via a group such as a software engineering process group. This group is responsible for the organization's software process activities. It is specifically responsible for the development and maintenance of the organization's standard software process and related process assets (as described in the Organization Process Definition key process area), and it coordinates the process activities with the software projects. (L3-1)

OPD process description

Organization Process Definition involves developing and maintaining the organization's standard software process, along with related process assets, such as descriptions of software life cycles, process tailoring guidelines and criteria, the organization's software process database, and a library of software process-related documentation.

These assets may be collected in many ways, depending on the organization's implementation of Organization Process Definition. For example, the descriptions of the software life cycles may be an integral part of the organization's standard software process or parts of the library of software process-related documentation may be stored in the organization's software process database.

The organization's software process assets are available for use in developing, implementing, and maintaining the projects' defined software processes. (The practices related to the development and maintenance of the project's defined software process are described in the Integrated Software Management key process area.) (L3-11)

Continued on next page

Level 3 - Standards

Level 3 standards

The CMM recommends the contents of the following work products at level 3:

√	KPA	Standards at Level 3	References
	OPF	Action plan. (L3-6, A1)	
	OPF	Software development and improvement plan. (L3-7, A2)	
	OPD	Organization's standard software process. (L3-17, A2)	
	OPD	Software process element. (L3-17, A2, 2)	
	OPD	Tailoring guidelines and criteria (for projects' tailoring of the organization's standard software process). (L3-19, A4, 1)	
	TP	Software project's training plan. (L3-29, A1)	
	TP	Organization's training plan. (L3-32, A3)	
	TP	Organizational standards for training courses. (L3-33, A4)	
	ISM	Project's defined software process. (L3-44, A4)	
	SPE	Software design documentation. (L3-71, A3, 8.1)	
	SPE	Test plan. (L3-75, A7, 2)	
	IC	Documented plan for intergroup commitments. (L3-88, A3)	
	PR	Plans for peer reviews. (L3-97, A1)	

Reference

Refer to the Level 3 Standards Checklists for additional information regarding the content of each standard.

Level 3 - Policies

Level 3 policies The following table lists the recommended policies in the CMM at level 3.

√	KPA	Description	References
	OPF	Written organizational policy for coordinating software process development and improvement activities across the organization. (L3-2, C1)	
	OPD	Written policy for developing and maintaining a standard software process and related process assets. (L3-12, C1)	
	TP	Written policy for meeting the organization's training needs. (L3-26, C1)	
	ISM	Written organizational policy requiring that the software project be planned and managed using the organization's standard software process and related process assets. (L3-38, C1)	
	SPE	Written organizational policy for performing the software engineering activities. (L3-60, C1)	
	IC	Written organizational policy for establishing interdisciplinary engineering teams. (L3-84, C1)	
	PR	Written organizational policy for performing peer reviews. (L3-94, C1)	

Level 3 - KPA Goals

Level 3 KPA goals

The following table lists the goals that are described in the CMM for each key process area at level 3.

√	KPA	CMM Goals at Level 3	References
	OPF	Software process development and improvement activities are coordinated across the organization. (L3-1, G1)	
	OPF	The strengths and weaknesses of the software processes used are identified relative to the process standard. (L3-2, G2)	
	OPF	Organization-level process development and improvement activities are planned. (L3-2, G3)	
	OPD	A standard software process for the organization is developed and maintained. (L3-12, G1)	
	OPD	Information related to the use of the organization's standard software process by the software projects is collected, reviewed, and made available. (L3-12, G2)	
	TP	Training activities are planned. (L3-25, G1)	
	TP	Training for developing the skills and knowledge needed to perform software management and technical roles is provided. (L3-25, G2)	
	TP	Individuals in the software engineering group and software-related groups receive the training necessary to perform their roles. (L3-26, G3)	
	ISM	The project's defined software process is a tailored version of the organization's standard software process. (L3-38, G1)	
	ISM	The project is planned and managed according to the project's defined software process. (L3-38, G2)	
	SPE	The software engineering tasks are defined, integrated, and consistently performed to produce the software. (L3-60, G1)	
	SPE	Software work products are kept consistent with each other. (L3-60, G2)	
	IC	The customer's requirements are agreed to by all affected groups . (L3-84, G1)	
	IC	The commitments between the engineering groups are agreed to by the affected groups . (L3-84, G2)	
	IC	The engineering groups identify, track, and resolve intergroup issues. (L3-84, G3)	
	PR	Peer reviews are planned. (L3-93, G1)	
	PR	Defects in the software work products are identified and removed. (L3-93, G2)	

Level 3 - KPA Purposes

Level 3 KPA purposes

The following table describes the purpose of each key process area in the CMM at level 3.

√	KPA	Purpose of KPAs at Level 3
	OPF	The purpose of Organization Process Focus is to establish the organizational responsibility for software process activities that improve the organization's overall software process capability. (L3-1)
	OPD	The purpose of Organization Process Definition is to develop and maintain a usable set of software process assets that improve process performance across the projects and provide a basis for cumulative, long-term benefits to the organization. (L3-11)
	TP	The purpose of the Training Program key process area is to develop the skills and knowledge of individuals so they can perform their roles effectively and efficiently. (L3-25)
	ISM	The purpose of Integrated Software Management is to integrate the software engineering and management activities into a coherent, defined software process that is tailored from the organization's standard software process and related process assets, which are described in Organization Process Definition. (L3-37)
	SPE	The purpose of Software Product Engineering is to consistently perform a well-defined engineering process that integrates all the software engineering activities to produce correct, consistent software products effectively and efficiently. (L3-59)
	IC	The purpose of Intergroup Coordination is to establish a means for the software engineering group to participate actively with the other engineering groups so the project is better able to satisfy the customer's needs effectively and efficiently. (L3-83)
	PR	The purpose of Peer Reviews is to remove defects from the software work products early and efficiently. An important corollary effect is to develop a better understanding of the software work products and of defects that might be prevented. (L3-93)

Level 3 Summary

Overview

Section purpose The purpose of this section is to provide checklists that provide a summary of the defined level (level 3). This section contains three perspectives of a CMM level.

- *Key process area (KPA) specific information:*
 - KPA purpose
 - KPA goals
- *Operational framework information (from a maturity level viewpoint):*
 - Policies
 - Standards
 - Process descriptions
 - Procedures
 - Training
 - Tools
- *Other key process information (from a maturity level viewpoint):*
 - Reviews and audits
 - Work products managed and controlled
 - Measurements

Section overview

This section contains the following topics.

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Level 3 - Reviews and Audits	L3-Summary-14
Level 3 - Work Products Managed and Controlled	L3-Summary-25
Level 3 - Measurements	L3-Summary-27
