ISO 9001/TL 9000 and CMMI® Comparison

Purpose

- This summary is intended to give those familiar with CMMI® a general sense of the additional requirements contained in TL 9000

Overview - 1

- The TL 9000 standard adds specific telecom hardware, software and service requirements to the more generic practices specified by ISO 9001

- The CMMI® model describes generic best practices for creating software systems in any domain.

Overview - 2

- The TL 9000 standard contains specific detailed requirements
- CMMI® "requires" that goals be met, "expects" that practices related to those goals are implemented, and provides suggestions for detailed implementation of the practices as informative, not required, material

Overview - 3

- TL 9000 incorporates business needs as specific requirements
- CMMI® says that all the process areas, goals, and practices must be interpreted based on business needs of the organization, but as a more generic model, does not include any explicit business needs

Overview - 4

- TL 9000 is very strong in post-deployment requirements and measurements
- CMMI® focuses primarily on pre-deployment best practices and in-process measurements

Overview - 5

- TL 9000 gives specific instructions for customer involvement as stakeholders
- CMMI® expects the organization to identify and involve relevant stakeholders, but does not specify who they should be

The Bottom Line

- A CMMI® ML3 Appraised **software** organization will generally meet ISO 9000/TL 9000 requirements with gaps in the following areas:
  - Measurements Reporting
  - Post deployment support
  - Customer satisfaction surveys
  - Quality partnering
- TL 9000 hardware (H) and service (V) adders are not specifically addressed in CMMI®

TL 9000 Standard – Not Present

- This section includes four TL 9000 requirements that are not present in CMMI®
- Refer to the actual standards for full details of all requirements

TL 9000 Standard – Not Present

- 7.1.C.3 End of Life Planning
  - The organization shall establish and maintain a documented procedure(s) for the discontinuance of manufacturing and/or support of a product. The documented procedure(s) should include
    - a) cessation of full or partial support after a certain period of time,
    - b) archiving product documentation and software,
    - c) responsibility for any future residual support issues,
    - d) transition to the new product, if applicable, and
    - e) accessibility of archive copies of data. [9]

TL 9000 Standard – Not Present

- 7.2.3.C.1 Notification About Problems
  - The organization shall establish and maintain a documented procedure(s) to notify all customers who may be affected by a reported problem that is service affecting. [5]

TL 9000 Standard – Not Present

- 7.2.3.C.2 Problem Severity
  - The organization shall assign severity levels to customer-reported problems based on the impact to the customer in accordance with the definitions of critical, major, and minor problem reports contained in the glossary of this handbook, unless explicitly excluded by the TL 9000 Measurements Handbook. The severity level shall be used in determining the timeliness of the organization's response. [10]
  - 7.2.3.C.2-NOTE The customer and the organization should jointly determine the priority for resolving customer-reported problems.

TL 9000 Standard – Not Present

- 7.2.3.HS.1 Organization's Recall Process
  - The organization shall establish and maintain a documented procedure(s) for identifying and recalling products that are unfit to remain in service.

ISO/TL 9000 Standard - Partially Met

- 78 Requirements that are partially met depending on the robustness of the CMMI® implementation are listed in this section
- Columns:
  - The Left and Middle columns are from the ISO/TL standards. Blue text = ISO, Black = TL Adders
  - The ISO/TL verbiage is frequently NOT fully displayed to save space
  - The Right column has commentary and references CMMI abbreviations
- Refer to the actual standards for full details of all requirements

ISO/TL 9000 Standard- Partially Met

Section 4 Quality Management System		
4.1.g	*Where an organization chooses to outsource any process that affects product conformity with requirements, …*	Met by SAM with PP and IPM
Section 4.2 Documentation Requirements		
4.2.1 General ***4.2.1.a***	*The quality management system documentation shall include a) documented statements of a quality policy and quality objectives,*	intent is met mostly in GP2.1 of each PA and SG1 of OPF. TL auditors expect to see a single org wide quality policy.
4.2.1.b	*b) a quality manual,*	intent may be addressed in PAL in OPD and all GG2 but would be challenging to explain to TL auditor as a quality manual. Need to have an overall view of quality system.
Section 5 Management Responsibility		
5.2 Customer Focus	*Top management shall ensure that customer requirements are determined and are met with the aim of enhancing customer satisfaction (see 7.2.1 and 8.2.1).*	Specific implementation requirements for RD SG1 and SG3 with GG2 of RD and all other PAs. TL9000 has very specific expectations re: top management involvement in customer satisfaction.
5.2.C.1 Customer Relationship Development	Top management shall demonstrate active involvement in establishing and maintaining mutually-beneficial relationships between the organization and its customers.	Specific implementation requirements for RD SG1 and SG3 with GG2 of RD and all other PA. TL9000 has very specific expectations re: top mgmt involvement in customer satisfaction.
5.2.C.2 Customer Communication Procedures	The organization shall establish and maintain methods for communicating with selected customers... The outcome of customer communication should generate actions for resolving identified issues and provide opportunities for improving customer satisfaction.	Specific implementation requirements for RD SG1 and SG3 with GG2 of RD and all other PAs. TL9000 has very specific expectations re: top management involvement in customer satisfaction.

ISO/TL 9000 Standard- Partially Met

Section 5.4 Planning		
5.4.1 Quality Objectives	*Top management shall ensure that quality objectives, including those needed to meet requirements for product [see 7.1 a)], are established at relevant functions and levels within the organization...*	At least partially met by OPF, OPD with GG2 for all PAs.
5.4.1.C.1 Quality Objectives	Objectives for quality shall include targets for the TL 9000 measurements defined in the *TL 9000 Quality Management System Measurements Handbook*.	Specific implementation requirements for MA SG1.
5.4.2.C.2 Customer Input	The organization shall implement methods for soliciting and considering customer input for quality planning activities. The organization should establish joint quality improvement programs with customers.	Specific implementation requirements for GG3 and OPF with requirement to include customer input.
5.4.2.C.3 Supplier Input	The organization shall implement methods for soliciting and using supplier input for quality planning activities.	Specific implementation requirements for GG3 of SAM and OPF with requirement to include supplier input.
Section 5.5 Responsibility, Authority and Communication		
5.5.2 Management Representative	*Top management shall appoint a member of management who, ..., shall have responsibility and authority that includes…*	Partially met by OPF GG2 and supported by GG2 of all other PAs (may have to explain to auditor how this is accomplished w/ 2.4 & 2.10). Specific implementation requirements for OPF GP2.4
5.5.3 Internal Communication	*Top management shall ensure that appropriate communication processes are established within the organization and that communication takes place regarding the effectiveness of the quality management system.*	Specific requirement for implementation of GG2 all PA, particularly OPF.
5.5.3.C.1 Organization Performance Feedback	The organization shall inform employees of its quality performance and the level of customer satisfaction.	Specific implementation requirements for MA & OPF GP2.7 and OPF SP1.2

ISO/TL 9000 Standard- Partially Met

Section 5.6 Management Review		
5.6.1 General	*Top management shall review the organization's quality management system, at planned intervals, ...* *Records from management reviews shall be maintained (see 4.2.4).*	Partially addressed by GP 2.10 (PA/Project level) with OPF SG1
5.6.2 Review Input	*The input to management review shall include information on…*	Partially addressed by GP 2.10 (PA/Project level) with OPF SG1 with input/outputs as specific requirements to GP2.10
5.6.3 Review Output	*The output from the management review shall include any decisions and actions related to* *a) improvement of the effectiveness of the quality management system and its processes,* *b) improvement of product related to customer requirements, and* *c) resource needs.*	Partially addressed by GP 2.10 (PA/Project level) with OPF SG1 with input/outputs as Specific implementation requirements for GP2.10
Section 6 Resource Management		
6.1 Provision of Resources	*b) to enhance customer satisfaction by meeting customer requirements.*	Partially met by GG2 for all PAs particularly RD. TL 9000 expects some indication of how customer satisfaction is enhanced by the resources provided for the quality management system.
6.2.2.C.2 Quality and Process Improvement Concepts	Those employees that have a direct impact on the quality of the product, including top management, shall be trained in the fundamental concepts of continual improvement, problem solving, and customer satisfaction.	Specific implementation requirements for GP2.5 of all PAs - includes training in fundamental quality concepts.
6.2.2.C.4 ESD Training	All employees with functions that involve any handling, storage, packaging, preservation, or delivery of ESD-sensitive products shall receive training in electrostatic discharge (ESD) protection prior to performing their jobs.	Specific implementation requirements for OT SG1 and PP SP2.5
6.2.2.C.6 Hazardous Conditions Training Content	Where the potential for hazardous conditions exists, training content shall include…	Specific implementation requirements for OT SG1 and PP SP2.5 (see OHSHA & Safety department for your own implementation)
6.3.C.1 Infrastructure	The organization shall identify critical areas of the infrastructure and provide for the security needed to protect these areas. Security restoration plans shall be developed and periodically assessed.	Partially met by PP SG2 (SP2.3) and PMC SP1.4 which address security within the data management practices but do not directly address security restoration plans.

ISO/TL 9000 Standard- Partially Met

Section 7 Product Realization		
7.1.C.1 Life Cycle Model	The organization shall establish and maintain an integrated set of method(s) that covers the life cycle of its products. The method(s) shall contain, as appropriate, the processes, activities, and tasks involved in the concept, definition, development, introduction, production, operation, maintenance, and (if required) disposal of products, spanning the life of the products.	OPD specifies process architecture, PP & IPM plus GG2 of all PAs plan for how it's all put together for a project. CMMI does not specify methods for end of life part of life cycle, but IPM says processes must be defined for entire product lifecycle.
7.1.C.2 Disaster Recovery	The organization shall establish and maintain documented plans for disaster recovery to ensure the organization's ability to recreate and service the product throughout its life cycle.	Specific implementation requirements - CMMI does not directly address disaster recovery however risk mitigation practices (RSKM, CM, RD, TS practices can be applied to address disaster recovery)
7.1.C.4 Tools Management	The organization shall ensure that internally developed software and/or tools used in the product life cycle are subject to the appropriate quality method(s).	Not fully met but supported by GG2 for the engineering PAs; Specific implementation requirements for management of the development & test environment tools beyond what CMMI requires.

ISO/TL 9000 Standard- Partially Met

Section 7.2 Customer-related Processes		
7.2.2.C.2 Contract Review	The organization shall establish and maintain a contract review process that should include…	CMMI does not specify a contract review process (except for contracts with suppliers) but majority (not incl item c) of these activities are supported by CMMI practices in all PAs. Supplier contract review is met by SAM SG1.
7.2.3 Customer Communication	*The organization shall determine and implement effective arrangements for communicating with customers in relation to…*	CMMI does not have a customer communication process but this is supported by GP2.7 in many of the Pas
7.2.3.C.3 Problem Escalation	The organization shall establish and maintain a documented escalation procedure(s) to resolve customer-reported problems.	CMMI does not specify a customer communication process but this is supported by GP2.7 in many of the Pas
7.2.3.C.4 Customer Feedback	The organization shall provide the customer with feedback on their problem reports in a timely and systematic manner.	CMMI does not specify a customer communication process but this is supported by GP2.7 in many of the Pas
7.2.3.HS.2 Design and Development Process Quality Measurements Data Reporting	On request by the customer, communications shall include reporting and evaluation of a jointly agreed set of design and development process measurements.	Specific implementation requirements for MA and PP, PMC

ISO/TL 9000 Standard- Partially Met

Section 7.3 Design and Development		
7.3.1.HS.1 Migration Planning	The organization shall develop and document a migration plan when a system, hardware or software product is planned to be migrated from an old to a new operational environment. If the old environment will no longer be supported, users shall be given …	Specific implementation requirements for OPD SG1 and the engineering PAs. CMMI model expects that post deployment needs will be addressed as a part of planning & development but does not specify how those needs will be met.
7.3.1.HS.1.a	The migration plan should also include...	Specific implementation requirements for OPD SG1 and the engineering PAs. CMMI model expects that post deployment needs will be addressed as a part of planning & development but does not specify how those needs will be met.
7.3.1.S.3 Computer Resources	The organization shall establish and maintain methods for estimating and tracking critical computer resources for the target computer, the computer on which the software is intended to operate.	Specific implementation requirements for GG2 of the engineering practices.
7.3.2.C.1 Customer and Supplier Input	The organization shall establish and maintain methods for soliciting and using customer and supplier input during the development of new or revised product requirements.	Specific implementation requirements for stakeholder involvement in RD and REQM and IPM SG2
7.3.2.C.2 Design and Development Requirements	Design and development requirements shall be defined and documented, and should include…	Specific implementation requirements for RD and REQM and VAL SG1.

ISO/TL 9000 Standard- Partially Met

7.3.3 Design and Development Outputs	*The outputs of design and development shall be provided in a form that enables verification against the design and development input and shall be approved prior to release. Design and development outputs shall...*	Specific implementation requirements for Technical Package in TS SG2
7.3.3.V.1 Services Design and Development Output	The required output from the services design and development shall contain a complete and precise statement of the service to be provided. Design and development outputs shall include…	Specific implementation requirements for developing technical solution when product is a service in V1.1.. In V1.2 it will be met by services constellation.
7.3.5.C.1 Verification of Documentation	The organization shall verify the customer and/or user documentation prior to product delivery.	Specific implementation requirements for VER SG1 and SG3, as well as VAL SG1 and SG2
7.3.5.HS.1 Stress Testing	The organization shall test the product under stress conditions, including, but not limited to, out-of-boundary and invalid input conditions, high volume and peak load simulations, and operational errors.	Specific implementation requirements for VAL SG1 and SG2. Might also show up in VER
7.3.5.HS.2 Abnormal Conditions	The organization shall test the product under abnormal conditions, which shall include, as appropriate...	Specific implementation requirements for VAL SG1 and SG2. Might also show up in VER
7.3.6.S.1 Release Management	The organization shall establish and maintain method(s) to ensure that the release and delivery of software products and related documentation are carried out under controlled conditions. Method(s) should provide for the delivery to the customer of ...	Specific implementation requirements for PI SG3 and supported by CM SG1, SG2 and SG3.
7.3.7.C.2 Informing Customers	The organization shall establish and maintain a documented procedure(s) to ensure that customers are informed when design changes affect contractual commitments.	Specific implementation requirements for REQM SG1 and GG2
7.3.7.C.3 Problem Resolution Configuration Management	The organization shall ensure that its configuration management system tracks fixes to problems and incorporates those fixes in future revisions.	Specific implementation requirements for CM to include fixes from patches and dot releases in future releases of the code
7.3.7.H.1 Component Changes	The organization shall have a documented procedure(s) in place to ensure that material or component substitutions or changes do not adversely affect product quality or performance. The documented procedure(s) should include…	Specific implementation requirements for TS SG1 and SAM SG1 and SG2

ISO/TL 9000 Standard- Partially Met

Section 7.4 Purchasing		
7.4.1.C.1 Purchasing Procedure(s)	The organization shall establish and maintain a documented purchasing procedure(s) to ensure…	Specific implementation requirements for SAM SG1 and SG2, as well as GG2 and GG3
7.4.2 Purchasing Information	*Purchasing information shall describe the product to be purchased, including where appropriate...B57*	Specific implementation requirements for MA SG1
Section 7.5 Production and Service Provision		
7.5.1 Control of Production and Service Provision	The organization shall plan and carry out production and service provision under controlled conditions. Controlled conditions shall include, as applicable…	Specific implementation requirements for IPI SG 1 and SG2
7.5.1.C.1 Service Resources	The organization shall provide customer contact employees with appropriate tools, training, and resources necessary to provide effective and timely customer service.	Specific implementation requirements for PP SG1 and SG2 as well as OPD SG 1 and IPM SG1.
7.5.1.C.2 Product Delivery	The organization shall establish and maintain method(s) to minimize interference with the customer's normal site operation and service during product delivery and installation.	Specific implementation requirements for PI SG1 and SG3, as well as TS SG1 and RD SG1 and SG3
7.5.1.HS.1 Emergency Service	The organization shall ensure that services and resources are available to support recovery from emergency failures of product in the field throughout its expected life. The organization shall identify potential situations that may have an impact on its ability to provide the emergency service and shall have response plans to address these situations. These plans shall be based on risk and periodically assessed.	Specific implementation requirements - services related to the product will be implemented via specific and generic practices of PP, RSKM and all the engineering PAs

ISO/TL 9000 Standard- Partially Met

7.5.1.HV.1 Operational Changes	Each time a significant change is made in the established operation (e.g., a new operator, new machine, or new technique), a critical examination shall be made of the first unit(s)/service(s) processed after the change.	Specific implementation requirements for VER SG1 and SG3 and VAL SG1 and SG2
7.5.1.S.1 Patching Procedure(s)	The organization shall establish and maintain a documented patching procedure(s) that…	Specific implementation requirement for PI
7.5.1.S.2 Patch Documentation	The organization shall establish and maintain methods to ensure that all documentation required to describe, test, install, and apply a patch has been verified and delivered with the patch.	Specific implementation requirement for PI
7.5.1.S.3 Replication	The organization shall establish and maintain a documented procedure(s) for replication, which should include…	Specific implementation requirements for PI SG3 and for CM SG1, SG2 & SG3
7.5.1.V.1 Software Used in Service Delivery	Organizations shall document and implement processes for the maintenance and control of software used in service delivery to ensure continued process capability and integrity.	Specific implementation requirements for IPM SG1 and OPD SG1 and PI GG2; may be better supported by services constellation.
7.5.1.V.2 Tool Changes	The organization shall have a documented procedure(s) in place to ensure that substitutions or changes to tools used in performing the service do not adversely affect the quality of the service.	Specific implementation requirements for IPM SG1 and OPD SG1 and PI GG2; may be better supported by CMMI-SVC (services) constellation.

ISO/TL 9000 Standard- Partially Met

7.5.2 Validation of processes for production and service provision	*The organization shall validate any processes for production and service provision where the resulting output cannot be verified by subsequent monitoring or measurement. This includes any processes where deficiencies become apparent only after the product is in use or the service has been delivered. Validation shall demonstrate...*	Specific implementation requirements for VAL SG1 & SG2, PPQA SG1 & SG2 and OPF SG1 may be better supported by CMMI-SVC (services) constellation.
7.5.4 Customer Property	*The organization shall exercise care with customer property while it is under the organization's control or being used by the organization...*	Specific implementation requirement for PP SG2 and supported by CM.
7.5.5 Preservation of Product	*The organization shall preserve the conformity of product during internal processing and delivery to the intended destination. This preservation shall include identification, handling, packaging, storage and protection…*	Specific implementation requirement for PI related to shipping & handling.
7.5.5.C.1 Electrostatic Discharge Sensitive (ESDS) Protection	Where applicable, anti-static protection shall be employed for components and products susceptible to electrostatic discharge (ESD) damage.	Strong HW related implementation requirement for IPM SG1, PI, CM, OPF, OPD SG1
7.5.5.HS.1 Packaging and Labeling Verification	The organization shall establish and maintain methods to ensure that the packaging and labeling of products and components conform to specified requirements.	Specific implementation requirements for PI SG3

ISO/TL 9000 Standard- Partially Met

7.5.5.H.1 Deterioration	Where the possibility of deterioration exists, the organization shall establish and maintain methods to determine when materials that may impact product quality have deteriorated or exceeded their expiration dates, and assess any required subsequent action.	Specific implementation requirement for PI related to hardware storage.
7.5.5.S.1 Software Virus Protection	The organization shall establish and maintain methods for software virus prevention, detection, and removal from the deliverable product.	Specific implementation requirements for RD and other engineering process areas
7.6 Control of Monitoring and Measuring Devices	*The organization shall determine the monitoring and measurement to be undertaken and the monitoring and measuring devices...*	Specific implementation requirements for IPM SG1 & GG2, VER SG1and all other engineering Pas
7.6.a	*Where necessary to ensure valid results, measuring equipment shall* *a) be calibrated …*	Specific implementation requirements for IPM SG1 & GG2, VER SG1and all other engineering Pas
7.6.C.1 Equipment Identification	Monitoring and measuring devices that are either inactive or unsuitable for use shall be visibly identified and not used. All monitoring and measuring devices that do not require calibration shall be identified.	Specific implementation requirements for IPM SG1 & GG2, VER SG1and all other engineering Pas

ISO/TL 9000 Standard- Partially Met

Section 8 Measurement, Analysis and Improvement		
8.2.1 Customer Satisfaction	*As one of the measurements of the performance of the quality management system, the organization shall monitor information relating to customer perception as to whether the organization has met customer requirements…*	Specific implementation requirements for MA
8.2.1.C.1 Customer Satisfaction Data	The organization shall establish and maintain a method to collect data directly from customers concerning their satisfaction...	Specific implementation requirements for MA
8.2.2 Internal Audit	*The organization shall conduct internal audits at planned intervals...*	Specific implementation requirements for OPF SG1 and PPQA SG1
8.2.4.H.1 Periodic Retesting	The organization shall establish and maintain a documented procedure(s) that ensures products are periodically retested...	Hardware implementation requirement related to REQM SG1 and VER SG1 and SG3
8.2.4.H.2 Content of Testing	Content of Testing – The initial test and periodic retest shall be more extensive than the routine quality tests...	Hardware implementation requirement related to REQM SG1, VER (SG1, SG3) and VAL (SG1, SG2).
8.2.4.H.3 Frequency of Testing	The organization shall establish and document the frequency for test and periodic retest...	Hardware implementation requirement related to REQM SG1 and VER SG1 and SG3
8.2.4.H.4-Testing of Repair and Return Products	Repair and return products shall be subjected to the appropriate evaluation(s) and/or test(s) to ensure functionality to product specification.	Specific implementation requirement for VER and VAL of hardware product that is being repaired and returned.

ISO/TL 9000 Standard- Partially Met

8.2.4.HV.1 Inspection and Test Documentation	Each inspection or testing activity shall have detailed documentation. Details should include…	Specific implementation requirement for VER and VAL of hardware and services
8.2.4.HV.2 Inspection and Test Records	Inspection or test records shall include…	Specific implementation requirement for VER and VAL of hardware and services
8.4.a	*a) customer satisfaction (see 8.2.1),*	Specific implementation requirement for all of the above
8.4.d	*d) suppliers.*	Specific implementation requirement for GG2 and GG3 of SAM
8.4.H.1 Field Performance Data	The quality management system shall include the collection and analysis of field performance data which can be used to help identify the cause and frequency of product failure. In addition, no trouble found (NTF) data shall also be maintained. This information shall be provided to the appropriate organizations to foster continual improvement.	Specific implementation requirement for HW post deployment metrics in MA SG1 & SG2 and PI GG3.
8.4.V.1 Service Performance Data	The quality management system shall include the collection and analysis of service performance data, which can be used to identify the cause and frequency of service failure. This information shall be provided to the appropriate organizations to foster continual improvement of the service.	Specific implementation requirement for services post deployment metrics in MA SG1 & SG2 and PI GG3.