

CMMI, ISO and AS9100: An Efficient and Effective Approach

**CMMI Technology Users Conference
Denver, CO**

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November 17, 2011



- Standards: A Necessity for Doing Business
- Standards Across Our Organization
- An Integrated Approach
- Standards Comparisons
- Steps to Developing and Integrated Approach

Compliance Standards: A Necessity for Doing Business

ISO TickIT CMMI IEEE 1220
ISO/IEC 42010 Sarbanes-Oxley
AS9100 ISO/IEC 15288
ISO9001:2008 ISO14001
ISO/IEC 12207
EIA/IS 632



NGES Standards Compliance and Certifications

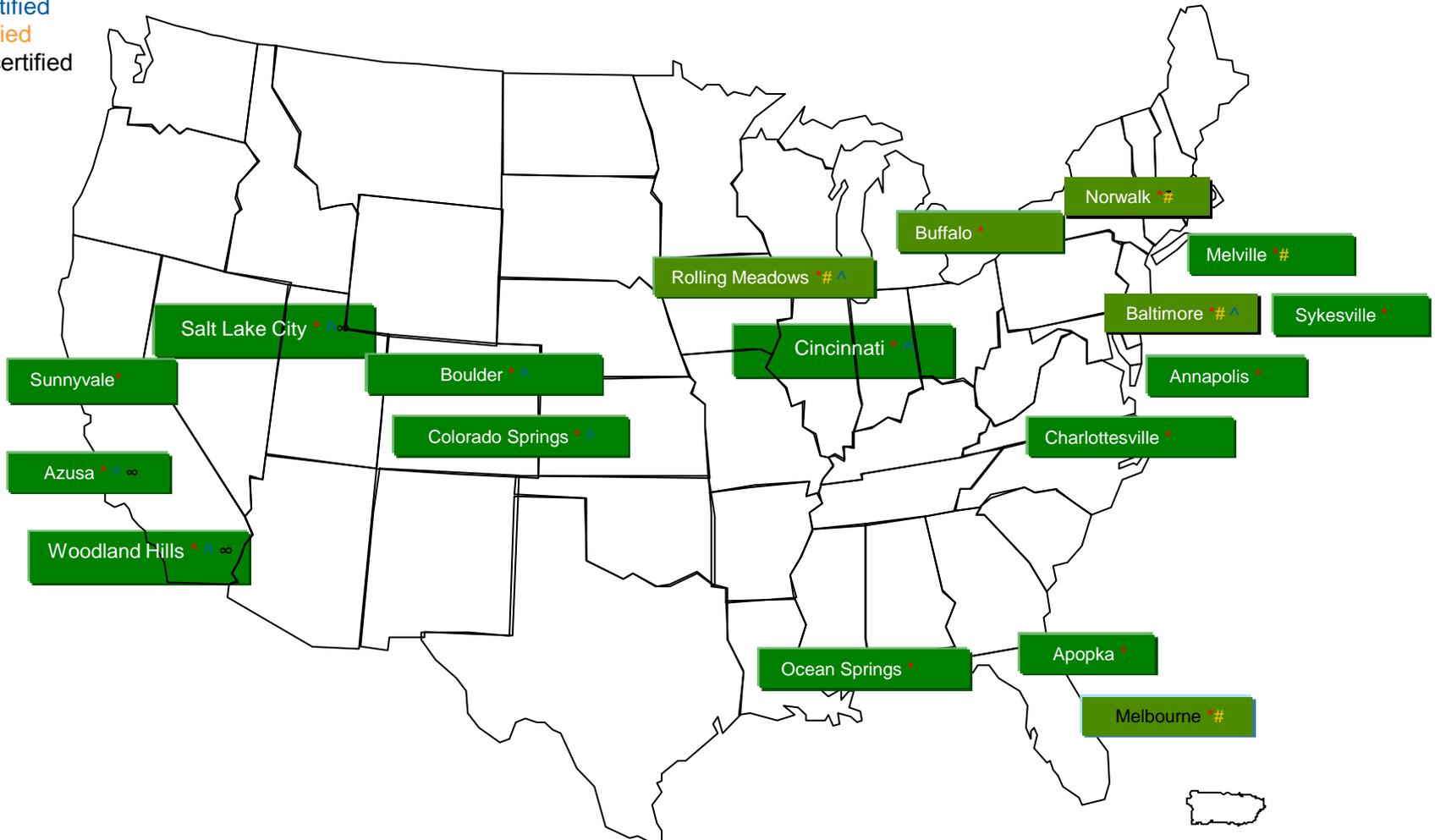
CMMI Certified

*ISO Certified

^AS9100 Certified

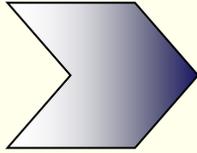
#TickIT Certified

∞ISO14001 certified



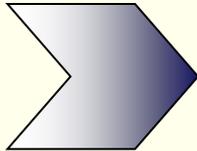
Compliance Standards: Driven by the Business

For Our
Customers



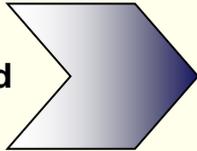
Innovative, high-performance, affordable products and services, **delivered on time** and with the **promised performance, quality and reliability**, that ensure our customers' success in their operations

For Our
Shareholders



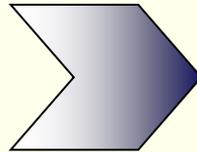
Business performance that is **predictable and reliable**, delivering sustained returns on shareholders' investments

For the
Corporation and
the Sector



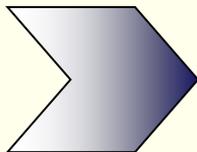
Technical and business processes that are faster, more profitable, and able to deliver products and service with **more performance, better quality, and lower cost** than our competitors

For Our
Businesses &
Programs



Deliverable products & services and internal technical & business processes that ensure our ability to **meet or exceed the contract commitments** we have made.

For Our
Employees

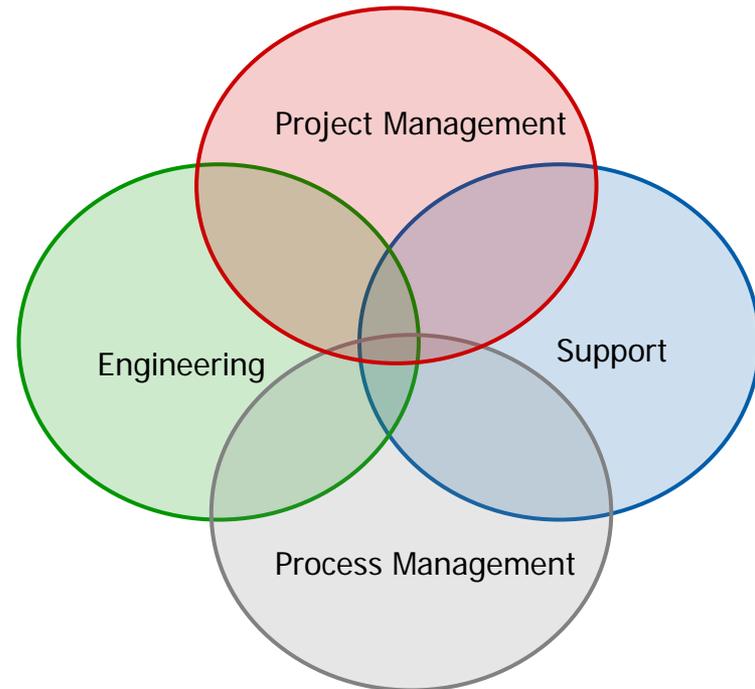


A work environment that makes it easy for employees to apply their natural talents with passion and excellence and to gain new skills and capabilities that will **open up future opportunities** for success

Compliance is the cost of doing GOOD business

The CMMI® (Capability Maturity Model Integration) model

- It is a model with 22 inter-related process areas grouped by category: Engineering, Support, Project Management, Process Management
- It is used to measure project management and development activities across project lifecycles.
- The CMMI is a process model that:
 - Is a collection of industry best practices
 - Contains a framework for organizing and prioritizing process improvement activities
 - Is used to emphasize the alignment of process improvement objectives and organizational business objectives



ISO: The Quality Management System

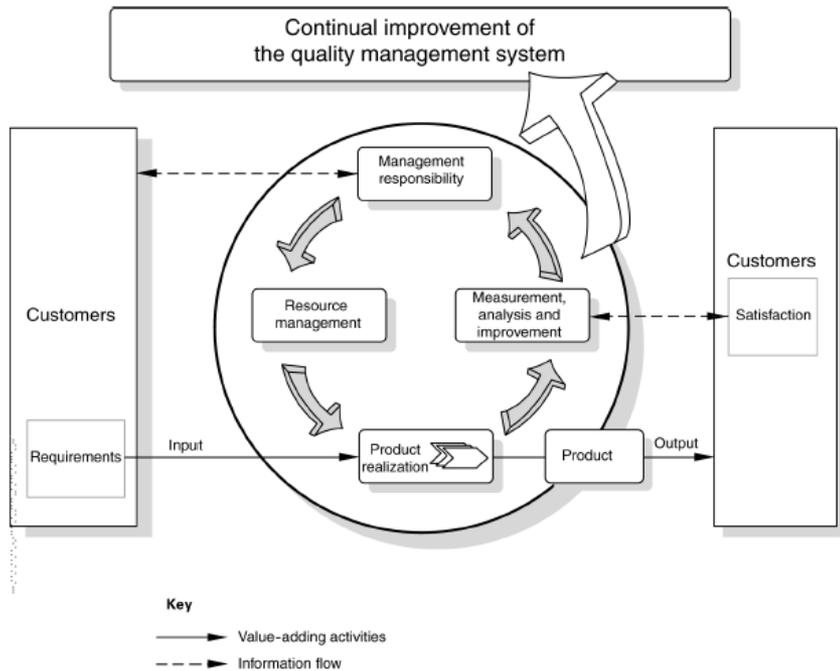


Figure 1 — Model of a process-based quality management system

- Section 4: Quality Management System
- Section 5: Management Responsibility
- Section 6: Resource Management
- Section 7: Product Realization
- Section 8: Measurement, Analysis and Improvement

We use ISO to meet the needs of customers and other stakeholders.

- AS 9100 Quality Systems - Aerospace - Model for Quality Assurance in Design, Development, Production, Installation and Servicing
 - **AS9100** is a widely adopted and standardized quality management system for the aerospace industry
 - The current version of AS9100 aligns the standard with ISO 9001:2008 and has extra requirements regarding Regulatory Compliance and the following aerospace-sector specific requirements:

- ISO 14001:2004 specifies requirements for an environmental management system
- Enable an organization to develop and implement a policy and objectives which take into account legal requirements and other requirements to which the organization subscribes, and information about significant environmental aspects. It applies to those environmental aspects that the organization identifies as those which it can control and those which it can influence. It does not itself state specific environmental performance criteria.

- ISO TickIT is a quality-management certification program for software development
- Major objective was to provide industry with a practical framework for the management of software development quality by developing more effective quality management system certification procedures. These involved:
 - publishing guidance material to assist software organizations interpret the requirements of ISO 9001
 - training, selecting and registering auditors with IT experience and competence, and
 - introducing rules for the accreditation of certification bodies practicing in the software sector

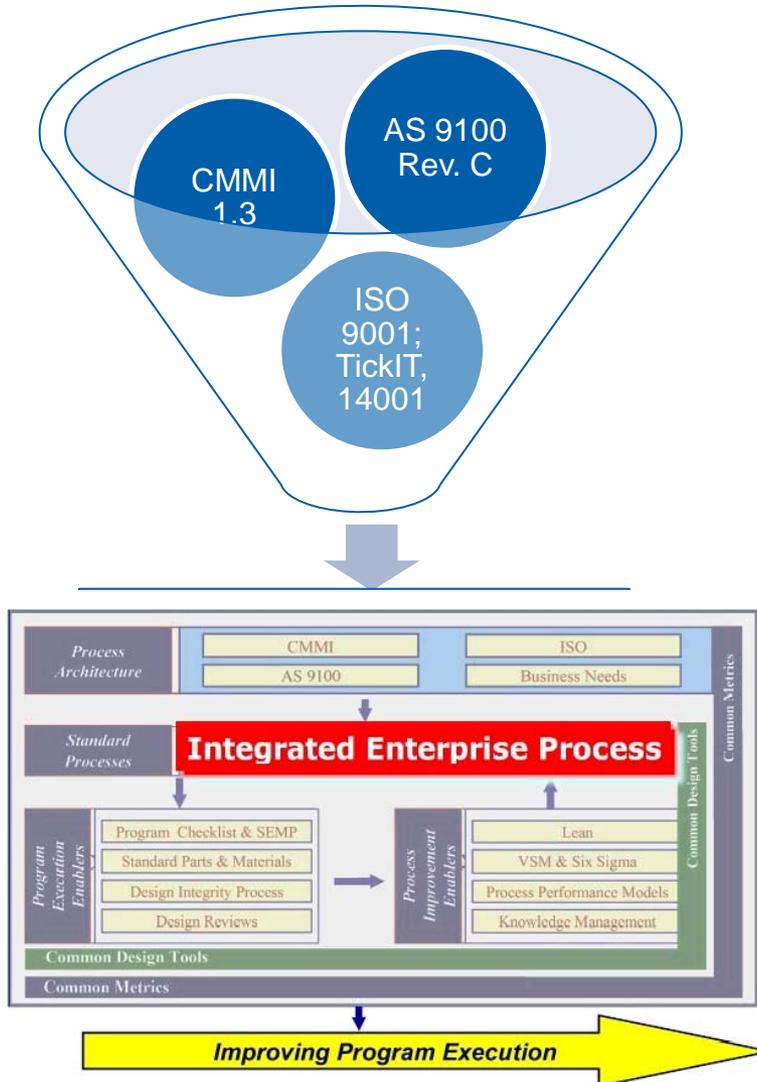
One Approach: Linear, One-to-One Compliance

Develop an organizational process for each major standard.

- AS 9100 Rev. C  AS 9100 Organizational Process
- CMMI 1.3  CMMI Organizational Process
- ISO 9001:2008  ISO 9001 Organizational Process
- ISO TickIT  ISO TickIT Organizational Process
- ISO 14001
- Sarbanes-Oxley Act of 2002

What do you do when there are multiple compliance requirements?

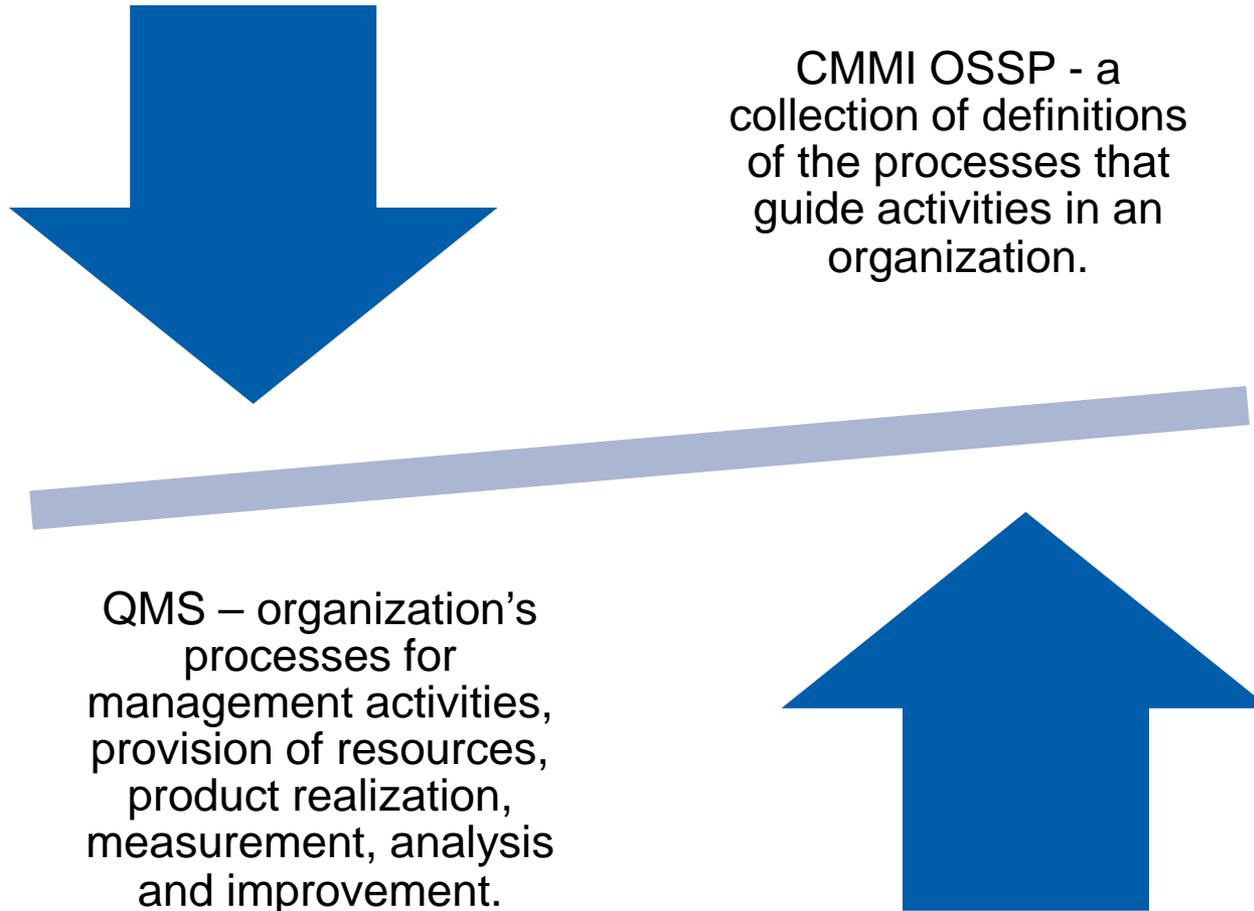
Our Approach: Integrated Enterprise Process



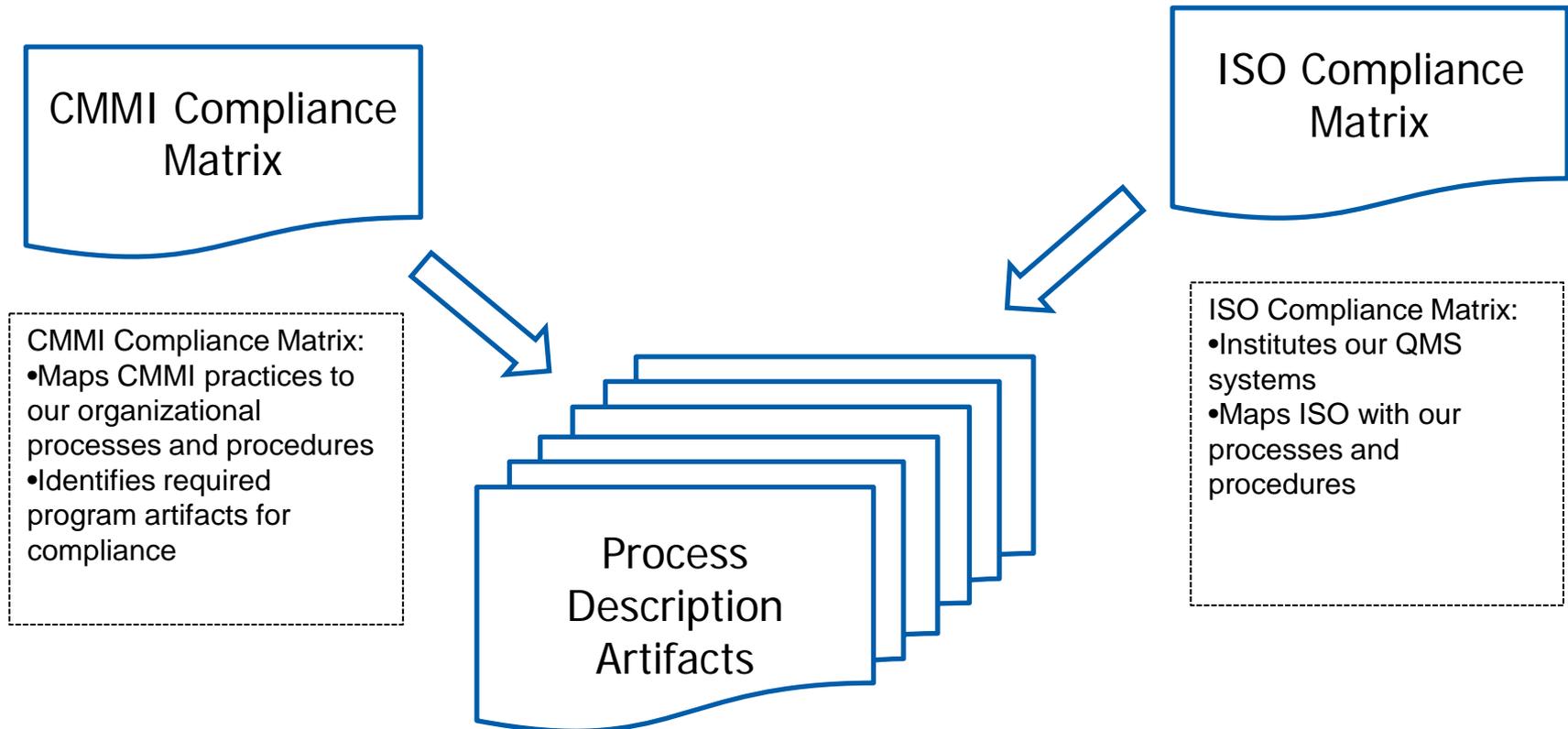
- Complies with key standards
- Encourages integration of all disciplines
- Eliminates duplications
- Implements “good” approaches to resolving “conflicts” between standards

... A Fundamental Competitive Advantage

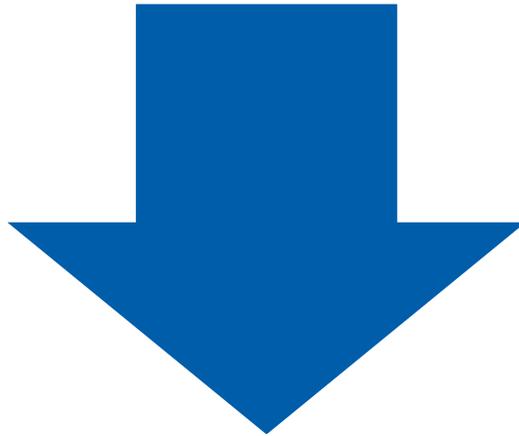
CMMI's OSSP vs. ISO's QMS (1 of 2): How did we balance the two?



CMMI's OSSP vs. ISO's QMS (2 of 2): Compliance Matrixes



CMMI Evaluations vs. ISO Internal Audits: How did we balance the two?

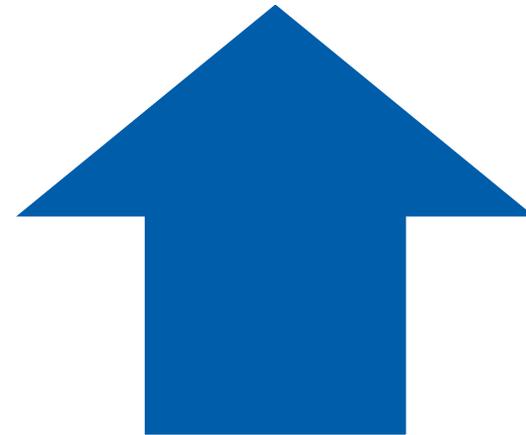


CMMI's Objective Evaluation (PPQA) involve:

- Objectively evaluating performed processes and work products against applicable process descriptions, standards, and procedures
- Identifying and documenting noncompliance issues
- Providing feedback to project staff and managers on the results of quality assurance activities
- Ensuring that noncompliance issues are addressed

ISO's Internal Audits are conducted at planned intervals to determine whether the quality management system

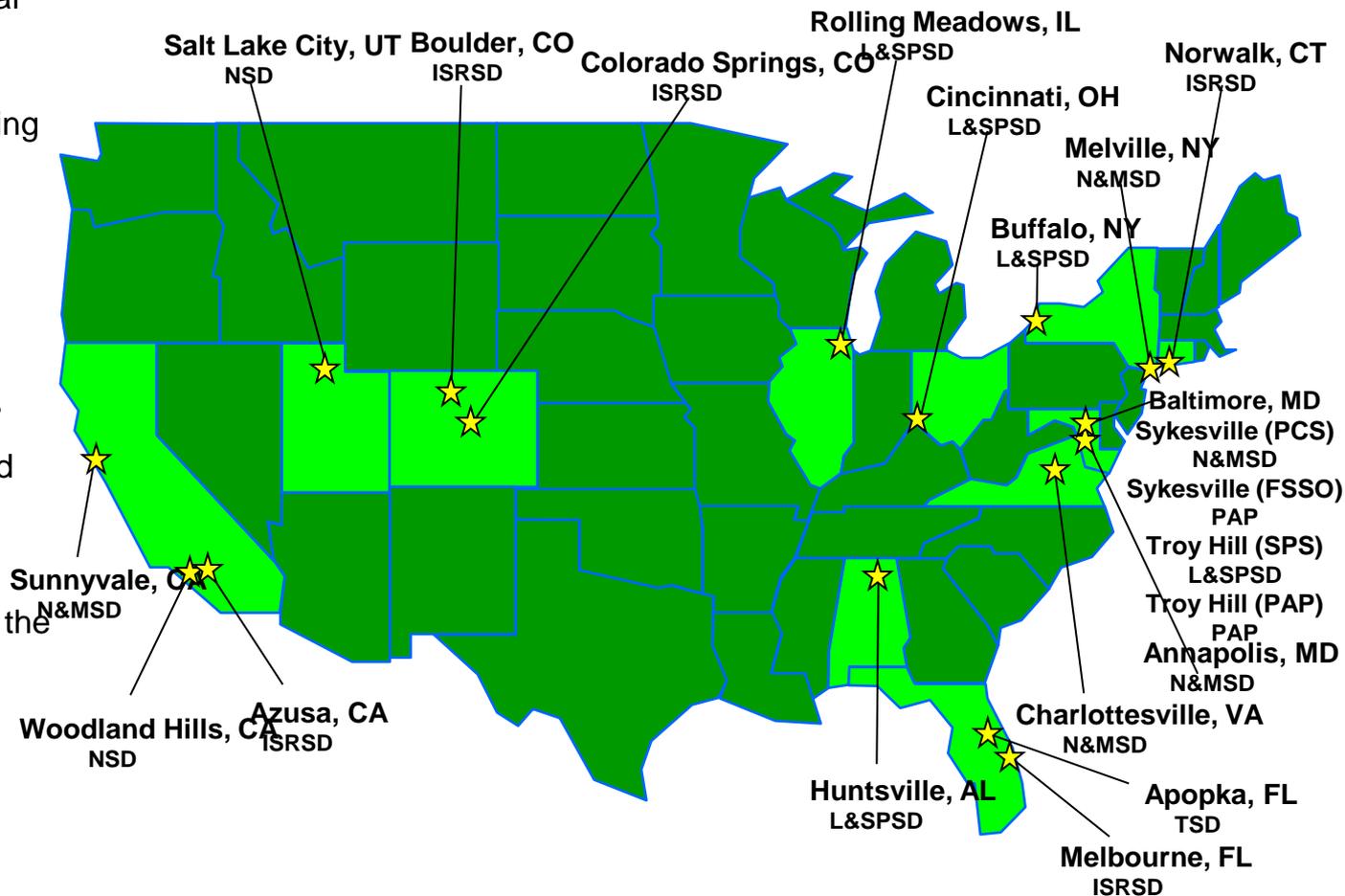
- Conforms to the planned arrangements (product realization plan), to the requirements of the ISO standard, and to the quality management system requirements established by the organization, and



CMMI Evaluations vs. ISO Internal Audits: Internal Audit Effectiveness

- Performs approximately 400 internal audits a year across the Baltimore campus covering programs, functional organizations, engineering disciplines and laboratories.
- Ensures compliance to IEP.
- Satisfies CMMI Process and Product Quality Assurance practices and ISO internal auditing requirements.
- Satisfies GP 2.9 across the CMMI Process Areas.

IAE Reporting Sites



CMMI Evaluations vs. ISO Internal Audits: IAE Timeline – Implementation & Baseline

ES launched initiative to evaluate and restructure its Internal Quality Audit function to focus more on risk areas as opposed to only emphasizing ISO/AS/TickIT certification

Criteria established for measuring incorporation of each recommendation

Reviewed campus internal audit schedules for incorporation of recommendations;

Provided feedback (including requests for objective evidence)

2008

2009

continued...

Cross-campus Kaizen events held to identify weaknesses in ES Internal Audit Program;

8 recommended enhancements identified

Requested each division to begin to incorporate enhancements into audit programs

Dashboard metrics established for reporting status

Capture baseline scoring

Determine program strengths and weaknesses

Incorporation of recommended enhancements = improvement

CMMI Evaluations vs. ISO Internal Audits: IAE Timeline – Implementation & Baseline (cont.)

Revised program for more emphasis on execution and improvement

Begin quarterly Sector visibility and reporting using revised scoring methodology

AE metric added to Sector Operating Factors

Incorporated new divisions structure

end of Jun... Sep... Dec

Report measured data to higher level management

Revised scoring process

2010

end of **2010**

end of **2011, 2012, 2013, ...**

Measure Effectiveness

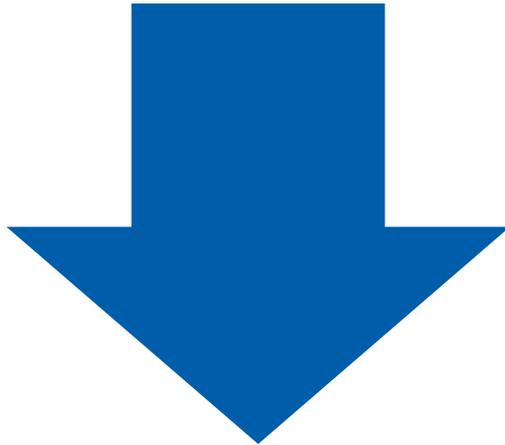
Request 2010 schedules
end of April

Collect, analyze, and interpret KPI data

Generate KPIs and objectives

Formal AE Implementation & Measurement

CMMI Higher Level Management Reviews vs. ISO Top Management Review (1 of 2)



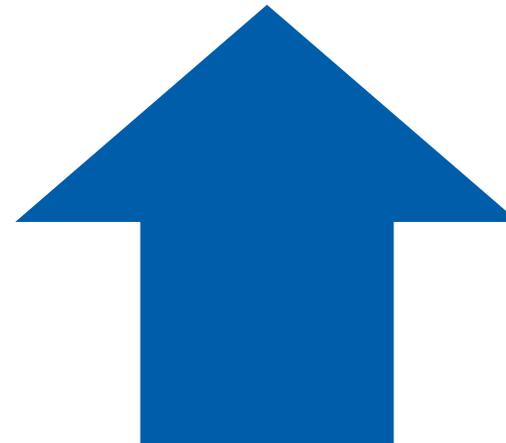
CMMI's Higher Level Management Reviews :

provide higher level management with appropriate visibility into the process. Different managers have different needs for information about the process. These reviews help ensure that informed decisions on the planning and performing of the process can be made. Therefore, these reviews are expected to be both periodic and event driven.

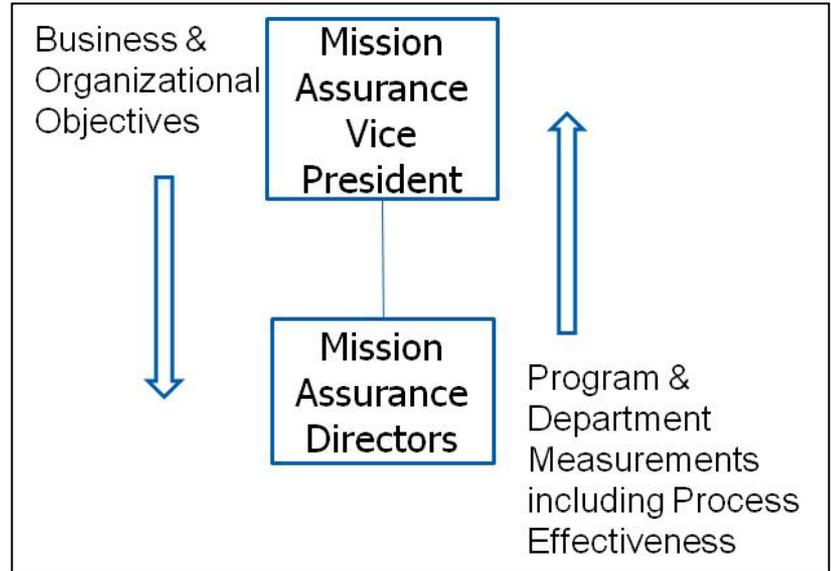
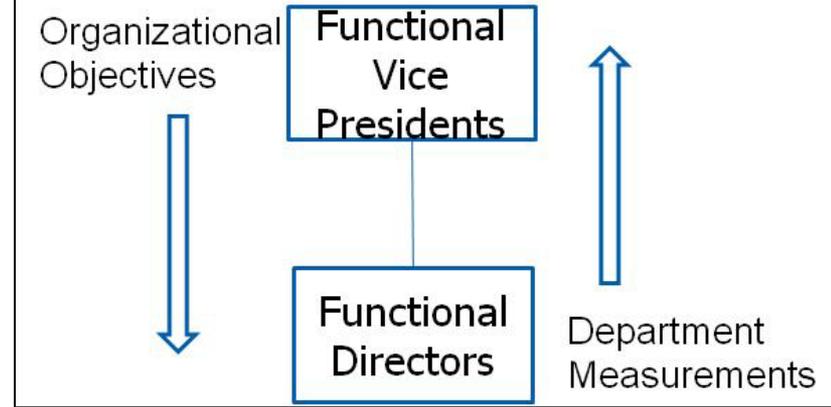
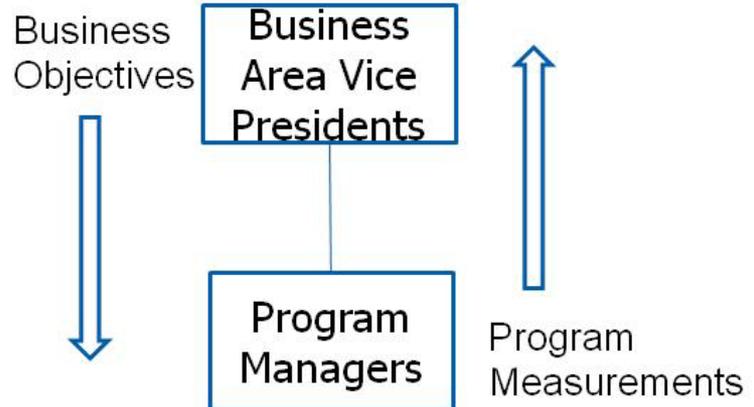


ISO Top Management Review:

Top management shall review the organization's quality management system, at planned intervals, to ensure its continuing suitability, adequacy and effectiveness. This review shall include assessing opportunities for improvement and the need for changes to the quality management system, including the quality policy and quality objectives.



CMMI's Higher Level Management Reviews vs. ISO's Top Management Review (2 of 2)



Steps to Developing a Multi-Standard Compliant Organizational Process

1. Assess the various process architectures/frameworks and decide which is best for your organization.
2. Identify the major process elements that comprise your organizational process.
 - Consider the Process Areas of CMMI, but don't overlook other important elements that may be significant to your business.
 - Consider the needs of the various disciplines required for your business.
 - Develop a process “model” identifying the order of execution of the process elements. *Note: there maybe more than one order required. Each discipline may have a more detailed process “model”..*
3. For each process element, identify the most stringent standard.

Steps to Developing a Multi-Standard Compliant Organizational Process

4. Develop the process element description to meet the requirements of the most stringent standard.
 - Attempt to retain, or slightly modify when necessary, the current practices that are working for the organization.
 - Develop new process only when absolutely necessary to comply. *Note: we don't recommend doing other process improvements at the same time.*
 - Build a matrix or equivalent identifying how compliance is achieved.
 - Include the appropriate process user representatives in the review activities.
 - Resolve discovered issues.
5. Validate that compliance is achieved.
 - Include an expert of the standard and quality.
 - Resolve discovered issues. Resolution may require further review by the process user representation.
6. Check to see if the other applicable standards are also achieved.
7. Integrate the process elements. Consistent with the process “model”

Steps to Developing a Multi-Standard Compliant Organizational Process

8. Check to see if the other applicable standards are also achieved.
 - If not, amend the process element description appropriately ensuring that compliance to the detailed standard is not lost.
 - Build matrices or equivalents identifying how compliance is achieved.
Note: each standard will have its own matrix or equivalent.
 - Include the process user, the standard expert, and quality in the review activities.

9. Integrate the process elements. Consistent with the process “model”:
 - Ensure that the inputs to each process element are in fact created by another process or available from a library, reference, or storage.
 - Ensure that the outputs from each process element supports follow-on activities or challenge its need.
 - If the integration drives changes to the process element, ensure the applicable compliances are sustained and update the compliance matrices as required.
 - Standard experts, process users and quality should participate in the review of changes as required.

- Rank compliance standard in order of importance to your business
- Leverage similarities between the standards
- Think Organizationally

NORTHROP GRUMMAN

