Using the Equity in AS9100C to Implement CMMI-DEV Maturity Level 3

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Transdyne Corporation

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MEI Technologies, Inc.
## Agenda

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AS9100C Overview

Foundation of AS9100C recognizes that a Quality Management System (QMS) is a strategic decision.

Among the key factors in implementing an AS9100C QMS are:

- Determining and documenting a quality policy and quality objectives
- Maintaining customer focus in meeting requirements (including regulatory and statutory), on-time delivery and product conformity
- Managing process performance to achieve quality goals
- Taking appropriate action if planned results are not/will not be achieved
- Managing suppliers
- Maintaining an effective risk management process

“This international standard promotes the adoption of a process approach when developing, implementing and improving the effectiveness of a quality management system (QMS), to enhance customer satisfaction by meeting customer requirements.”
AS9100C process improvement methodology PDCA is similar to the CMMI-DEV IDEAL model for improving processes.

1. Establish the objectives and processes necessary to deliver results in accordance with customer requirements and the organization's policies.

2. Implement the processes.

3. Monitor and measure processes and products against policies, objectives and requirements for the product and report the results.

4. Take actions to continually improve process performance.
1. Define Quality Policy and Quality Objectives
2. Know customer, statutory and regulatory requirements
3. Determine processes needed for the QMS
4. Determine criteria and methods to ensure operation and control of processes are effective
5. Ensure availability of resources and information to support operating and monitoring of processes
6. Ensure integrity of the QMS is maintained when changes are planned and implemented
7. Plan Management Reviews
**Procedure Requirements**

Control of documents and records  
Control of nonconforming products  
Implementing corrective and preventive actions  
Internal audits

**Record Requirements (implied processes):**

Quality Policy and Objectives  
Quality Manual  
Management Review  
Personnel education, training, skills, experience  
Control of work transfers & Customer property  
Risk Management  
Configuration Management  
Review of requirements  
Selection and development of embedded software  
Design and development inputs & changes  
Design and development reviews  
Verification and Validation  
Purchasing  
Release authorization of product

OPD, OPF, OT, MA, CM, PPQA, DAR, RD, REQM, TS, PI, PP, IPM, PMC, SAM, RSKM, VER, VAL  
CMMI-DEV… CL 3
Section 8.2.3 Monitoring and Measurement of Processes

• Provides visibility into the effectiveness of processes
• Signals need for corrective action of non-conforming process
• Uses root cause analysis to determine the cause and potential effect on other processes

Section 8.4 Analysis of Data

• Provides information relating to customer satisfaction and to conformity of product requirements
• Identifies trends of processes
• Identifies opportunities for preventive actions
• Gives insight into the effectiveness and suitability of suppliers

Reuse candidates for MA, OPF, CAR, PMC, SAM
Turtles describe the elements of a process similar to CMMI-DEV process descriptions.

Measurements and effectiveness thresholds are documented in turtles.

Process effectiveness is reviewed in planned meetings with upper level management.

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**Project Management Plan**

<table>
<thead>
<tr>
<th>Performance Objectives</th>
<th>Thresholds</th>
<th>Measurements</th>
<th>Method of Surveillance</th>
<th>Project Management Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Performance Thresholds: X of Y Total Contract Deliverables are Delivered on Schedule</td>
<td>100%</td>
<td>% X of Y</td>
<td>Monthly Status Reports</td>
<td>Project Management Plan</td>
</tr>
<tr>
<td>2 Performance Thresholds: X of Y Contract Performance Objectives met Required Thresholds</td>
<td>95%</td>
<td>% (X of Y)</td>
<td>Project Management Plan</td>
<td></td>
</tr>
<tr>
<td>3 Software Reliability: X of Y software deliverables were reopened after being closed</td>
<td>≤3%</td>
<td>% (X of Y)</td>
<td>Project Management Plan</td>
<td></td>
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</table>
### Examples of Reuse Mapping

<table>
<thead>
<tr>
<th>REUSE FUNCTION</th>
<th>CMMI-DEV PAs</th>
<th>AS9100C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Management</td>
<td>OPF, OPD, OT</td>
<td>Section 6.2.2 Competence, Training and Awareness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section 6.3 Infrastructure</td>
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<tr>
<td></td>
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<td>Section 6.4 Work Environment</td>
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<tr>
<td></td>
<td></td>
<td>Section 8.1 Measurement, Analysis and Improvement</td>
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<tr>
<td></td>
<td></td>
<td>Section 8.5.1 Continual Improvement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section 8.5.2 Corrective Action</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section 8.5.3 Preventative Action</td>
</tr>
<tr>
<td>Measurement</td>
<td>MA</td>
<td>Section 8.2 Monitoring and Measurement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section 8.2.1 Customer Satisfaction</td>
</tr>
<tr>
<td></td>
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<td>Section 8.2.3 Monitoring and Measurement of Processes</td>
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<tr>
<td></td>
<td></td>
<td>Section 8.2.4 Monitoring and Measurement of Product</td>
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<td></td>
<td></td>
<td>Section 8.3 Control of Nonconforming Product</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section 8.4 Analysis of data</td>
</tr>
<tr>
<td>Support Functions (except MA)</td>
<td>CM, PPQA, DAR</td>
<td>Section 3.3 Critical Items</td>
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<td>Section 7.5.3 Identification and Traceability</td>
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<td></td>
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<td>Section 7.1 Planning of Product Realization</td>
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<tr>
<td></td>
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<td>Section 7.1.3 Configuration Management</td>
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<td></td>
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<td>Section 4 Quality Management System</td>
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<td>Section 8.2.2 Internal Audit</td>
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</tbody>
</table>

*CMMI-DEV and AS9100C have different model structures. Do not expect to discover a one to one correspondence in the implementation of CMMI-DEV practices and AS9100C requirements. CMMI-DEV practices are often implemented by multiple AS9100 requirements.*
# Examples of Reuse Mapping

<table>
<thead>
<tr>
<th>REUSE FUNCTION</th>
<th>CMMI-DEV PAs</th>
<th>AS9100C</th>
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</table>
| Engineering             | RD, TS, PI, VER, VAL | Section 7  
Product Realization  
Section 7.2 Customer-Related Processes  
Section 7.3 Design and Development  
Section 7.4.3 Verification of Purchased Product  
Section 7.5 Production and Service Provision  
Section 7.5.3 Identification and Traceability |
| Project Management      | PP, PMC, IPM, RSKM, SAM, REQM | Section 4.1 General Requirements  
Section 4.2.3 Control of Documents  
Section 4.2.4 Control of Records  
Section 5.6 Management Review  
Section 7.1 Planning of Product Realization  
Section 7.1.1 Project Management  
Section 7.1.2 Risk Management  
Section 7.4 Purchasing  
Section 7.5.3 Identification and Traceability  
Section 8.1 Measurement, Analysis and Improvement  
Section 8.2.3 Monitoring and Measurement of Processes |
Using the AS9100C Equity to Plan the CMMI-DEV Journey

Which way to CMMI-DEV?

This way

That way

Turn back now!

Keys to Success

- Understand the business case
- Obtain higher management support
- Provide CMMI-DEV and SCAMPI training
- Plan and manage CMMI-DEV implementation as a project

Focus on “reuse” of AS9100C equity such as: processes, forms, templates, measurements, Turtles, SIPOCS, CPARs, etc.)

Do not throw existing assets away!

Transdyne Corporation
http://transdynecorp.com
Steps for Implementing CMMI-DEV Practices in AS9100C organizations

Understand the Commonality with AS9100C

Business Goals!

- Market area
- Revenue/profit
- Projected growth
- Quality factors

Develop CMMI project plan

What did we do well?

What do we need to improve?

Where were we lucky?

Monitor project performance

Where to start?

CMMI-DEV SCAMPI training for QM staff

QA, engineering staff

Inventory AS9100C assets using CMMI-DEV

What is missing?
- E.g. Where is process improvement planning data?

Estimate cost, time & resources

Lessons Learned

Do not use CMMI-DEV to inventory AS9100C assets
Complete continuous process improvement planning data to include SCAMPI tasks, such as PIID preparation, ATM training, readiness reviews, sampling factors, subgroups, project selection and data collection strategy.
AS9100C requirements map closely to the practices in CMMI-DEV 1.3

AS9100C practices are used in both manufacturing and services domain. Manufacturing processes are highly disciplined and rigorously controlled to meet performance and quality factors.

ASC9100 organizations often implement six sigma projects as an integral part of continuous process improvement and measurement capabilities to reach higher than CMMI ML 3.

Inventory by mapping your AS9100C practices to CMMI-DEV. Avoid mapping the CMMI-DEV practices to your assets.

Plan on an aggressive reuse campaign of AS9100C process assets. Do not disregard the potential value to achieving CMMI-DEV v1.3 goals.
You have just seen key benefits of using AS9100C to reach CMMI-DEV ML 3 from the “30,000 feet” level.

Questions or Comments?