

Introduction to the  
Testing Maturity Model Enhanced™ (TMMe)

Developed by

Thomas C. Staab

President

Wind Ridge International, LLC



11321 East Folsom Point Lane  
Franktown, Colorado 80116 USA  
303-660-3451 Phone  
303-660-2057 Fax

[info@windridgeinternational.com](mailto:info@windridgeinternational.com)  
[www.WindRidgeInternational.com](http://www.WindRidgeInternational.com)

# Introduction to the Testing Maturity Model Enhanced™ (TMMe)

Developed by  
Thomas C. Staab  
President  
Wind Ridge International, LLC

## Introduction

The first thing I want to say is that using a Testing Maturity Model for test process improvement is a very helpful and provides a return-on-investment (ROI). I state this as a fact because I have successfully used a variation of the Testing Maturity Model (TMM<sup>SM</sup>), developed by Dr. Eileen Burnstein of the Illinois Institute of Technology, with multiple clients ever since it was first introduced. The main problem with the original TMM<sup>SM</sup> is that it is very academic. I've had to modify it when using it in the "real world". In fact, I wrote an e-book in 2006, *The Real "How to" on TMM*, where I outlined my modifications up to that point. Continued use with clients has led me to make further modifications. Those modifications form the basis for the Testing Maturity Model Enhanced™ (TMMe).

The TMM Institute developed their own model - the TMMi<sup>®</sup>. This incorporates many of the changes I outlined in my e-book, but again it is still academic in nature. Also, the last time I checked, they have only developed goals and sub-goals through level 3. So I have continued making my own modifications for use with clients, and these modifications work. I am introducing the Testing Maturity Model Enhanced™ (TMMe) in this white paper.

## Background

One of the most important things I have learned in my years in business is that most senior managers are more comfortable making changes if they are based on an improvement model or if someone else has already done it. This has also been true

with the clients where I've used the TMM. In the process, I have also learned some other universal truths that have been integrated into the TMMe. These truths are:

- It is essential that improvements possess a corporate business value
- Improvements need to show a return-on-investment (ROI) from the start
- Test process improvements
  - Do not stand alone, they impact the entire company and development methodology
  - Need to support CMMI or other process improvement models
  - Need to live in the “real world”
  - Do not succeed without strong senior management support
  - Need a strong measurement program so you know if you are making improvements
- You cannot change everything at once. The changes need to take a phased-in approach

These truths have been the basis for the enhancements made to the TMM.

Like the TMM, the TMMe contains a strong emphasis on standardized methodology and processes. The development methodology a company chooses does not seem to matter as long as it is applied consistently across the whole Information Technology (IT) organization. The standardized processes supporting the methodology are essential. W. Edwards Deming, one of the founders of the modern quality movement, said, “If you can't describe what you are doing as a process, you don't know what you're doing.” This statement is still true today.

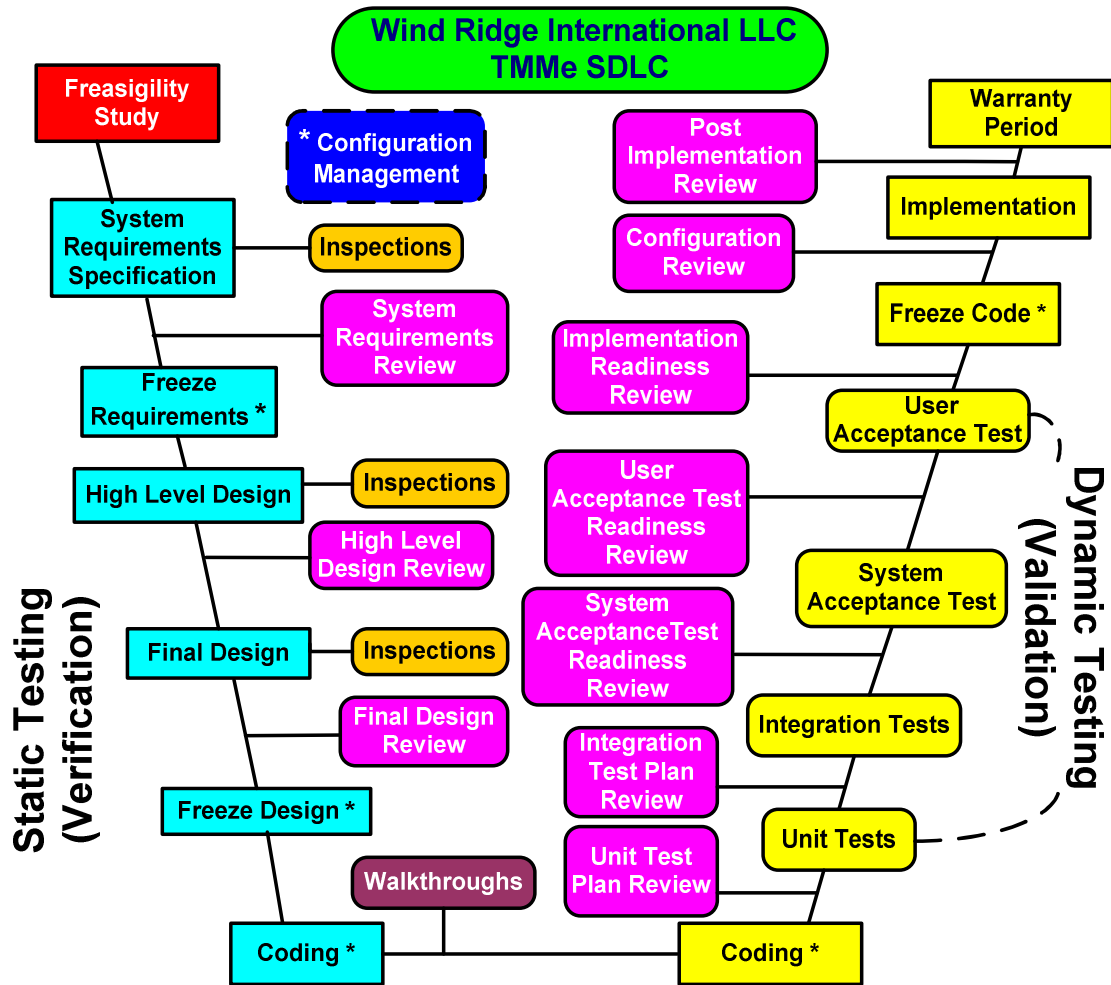
The Strategic Objectives (SO) and Supporting Values (SV) apply to virtually all companies and projects. In fact, so far, I have not found a company that cannot use them - from a 25 person IT organization to one that has 1,500 persons. The documentation will vary depending on the size of the organization and the size and complexity of the projects.

When you develop a model such as this, you cannot make it fit every condition. It just isn't possible to predict what you'll find, but with some modifications it can work. I have found this model can be adapted to virtually every condition I have encountered. The processes developed don't change, but the scope of the documents produced from those processes varies depending on the size of the organization or project.

Since CMMI only addresses testing at level three, and then by referring to it as verification and validation, the TMMe also had to address both verification and validation. In fact, I used verification (also called static testing) as the basis for level 2 and validation (also called dynamic testing) for level 3. The definitions for each of these terms, as contained in IEEE Standard 610.12, are listed below.

1. **Verification** – “The process of evaluating a system or component to determine whether the products of a given development phase satisfy the conditions imposed at the start of that phase.”
2. **Validation** – “The process of evaluating a system or component during or at the end of the development process to determine whether it satisfies specified requirements.”

The figure below is a V-model showing the different phases of the life cycle and the application of inspections, reviews, walkthroughs and formal tests. The development model you are using, waterfall, V-model or spiral, doesn't matter. These actions will apply to any SDLC model.



The model above makes it seem that verification and static testing ends after you freeze design. Static testing does end there, but verification carries over into dynamic testing with the unit, integration and, if you use them, interface testing. With these test you are fulfilling the IEEE definition of verification. You are checking to determine if they fulfill the conditions of the requirements and/or design. So validation really starts with System acceptance testing. Dynamic testing does encompass everything on the right leg of the V-model.

Now let's get on with describing the TMMe model.

Each level is divided into Strategic Objectives (SO) and Supporting Values (SV) for each of those objectives. Each SV will also usually have Sub-supporting values (SSV). This white paper will not discuss the SSVs.

Before you start on the TMMe journey you need to know your current level of maturity. The best way to do this is by performing an independent assessment using an outside entity. If you try to perform the assessment using company resources it is very hard for it to be viewed as independent. Without such a view, it will be extremely hard to get acceptance of the findings. People will always think that someone on the assessment team is trying to protect or promote their own interest.

I stated earlier that test process improvement affects the entire company and development process. Therefore, the assessment has to look at both the IT and business organizations, not just testing. If they are not of such a maturity that they will accept the testing changes, then there is no reason to begin this journey because you will fail. Test process improvements have to be integrated into the entire organization. They also require visual support of senior level management.

After the assessment is performed, the organization has to decide whether they want to start the journey. It is a journey. It will take time, money and commitment. There has to be a champion at the executive level of the organization that is committed to the success of the journey. Several actions need to take place once the assessment is complete.

- Evaluate the assessment results.
- Identify processes that need improvement.
- Develop the business value objectives.
- Perform a risk assessment.

- Calculate the projected ROI for implementing TMMe.
- Evaluate whether to start the process improvement journey.
- Prepare an action plan to present to senior management.

## Level 1

When an independent assessment is performed the results usually indicate that most IT organizations are at level 1. This level is defined by these characteristics contained in the original TMM:

- Testing is a chaotic process
- Ill defined and not distinguished from debugging
- Tests are developed ad hoc after coding is complete
- Objective of testing is to show software works
- Lacks trained staff, resources or tools
- Software often released without quality assurance

I have not been able to add to this definition developed by Dr. Burnstein. What I have found on occasion is that even though a company is at level 1 they are still trying to make improvements, but don't know where to start. Since they do not have an improvement roadmap to follow, such as a testing maturity model, their efforts are usually random, chaotic and lack focus.



## Level 2

This is a very important level because it is where we start putting structure into the testing process. Before we go any further we need to clarify what I mean by tests. When most people think of tests and testing, they immediately think of the formal structured tests such as:

- Unit test
- Integration test
- Interface test
- System acceptance test
- User acceptance test

These tests fit into the validation category. There is a whole different set of tests that fit into the verification category. These tests, as defined by IEEE Standard 610.12, are:

- **Inspections** – “A static analysis technique that relies on visual examination of development products to detect errors, violations of development standards, and other problems.”
- **Reviews** – “A process or meeting during which a work product, or set of work products, is presented to project personnel, managers, users, customers, or other interested parties for comment or approval. Types include code review, design review, formal qualification review, requirements review, test readiness review.”
- **Walkthroughs** – “A static analysis technique in which a designer or programmer leads members of the development team and other interested parties through a segment of documentation or code, and the participants ask questions and make comments about possible errors, violation of development standards, and other problems.”

Level 2 incorporates verification static testing. . The reasons for this focus are:

- It is fairly easy to implement
- It allows testing to:
  - Participate in the inspections to assure the requirements and design are testable
  - Start working on the test scenarios and cases
- It catches defects early in the life cycle where they are cheaper to correct
- It provides a tangible ROI

What do I base the last two bullet point on? Below is a chart of where defects are injected into a system, where they are found and the cost to correct. It was developed by Barry Boehm and documented in his book, “Software Engineering Economics”<sup>1</sup>. These figures are still valid today. People have tried to prove the figures have changed over the years, but have found they still apply.

<b>Life Cycle Phase</b>	<b>Caused</b>	<b>Quantity Found</b>	<b>Cost to Correct</b>
Requirements	56%	Few	\$1
Design	27%	Few	\$5
Code & Testing	7%	Many	\$50
Production	10%	Some	\$1000

So, if 83% of the defects are caused during the requirements and design phases, few are found at those levels and they only cost from \$1 to \$5 to correct, it seems logical to start improving the test process there. While an organization is working to improve the static testing at level 2 on new projects, that doesn't mean they need to discontinue what they are currently doing during static and dynamic testing for projects currently under development.

---

<sup>1</sup> Boehm, Barry, “Software Engineering Economics”, 1981, Prentice-Hall, Englewood Cliffs, NJ, ISBN 0-13-822122-7

I have identified the main categories at each level as Strategic Objectives (SO) with the Supporting Values (SV) listed below each SO. It is time to get started looking at the objectives at this level.

### **Primary Objective**

The primary objective of level 2 is to lay the groundwork for a planned and organized test process improvement and at the same time provide a ROI. The level 2 improvements will be used on all new projects entering the development pipeline.

### **Strategic Objective 2-1**

SO – 2-1 Secure approval for the initiative from senior level management.

### **Supporting Values**

SV – 2-1.1 Approval should come from the highest level of senior management such as, but not limited to, the Chief Executive Officer (CEO), the Chief Operating Officer (COO) and Chief Financial Officer (CFO).

SV – 2-1.2 Support for the initiative by senior management should be expressed in words, actions and funding.

### **Strategic Objective 2-2**

SO – 2-2 Perform an independent assessment of the current test process, including the current methodology.

### **Supporting Values**

SV – 2-2.1 The assessment needs to be viewed as independent and unbiased by the entire organization in order for the findings to be accepted. The best way is for it to be performed by an outside third party.

SV – 2-2.2 Use the evaluation to establish a baseline for the current status that includes metrics and the cost to identify the areas for improvement.

SV – 2-2.3 The assessment should not be limited to just the test process, but include the entire development methodology from concept approval to implementation.

SV – 2-2.4 Involve all stakeholders in the assessment.

### **Strategic Objective 2-3**

SO – 2-3 Develop processes for static and dynamic test measurements.

### **Supporting Values**

SV – 2-3.1 Define or revise the metrics.

SV – 2-3.2 Baseline the revised metrics.

SV – 2-3.3 Develop processes for using the metrics.

SV – 2-3.4 Communicate the revised metrics to the stakeholders.

### **Strategic Objective 2-4**

SO – 2-4 Develop a test plan process and template.

### **Supporting Values**

SV – 2-4.1 Develop a test plan template and approval process to be used on all projects.

SV – 2-4.2 Write the project test plan using the test plan template.

SV – 2-4.3 Distribute approved project test plan to all stakeholders.

### **Strategic Objective 2-5**

SO – 2-5 Implement a formal inspection and review process.

### **Supporting Values**

SV – 2-5.1 Develop a process for conducting formal project inspections and reviews.

SV – 2-5.2 Perform formal inspections and reviews on the project.

SV – 2-5.3 Certify that the project is ready to move to the next phase of development.

### **Strategic Objective 2-6**

SO – 2-6 Benchmark the revised processes and procedures against the baseline and calculate the return-on-investment (ROI).

### **Supporting Values**

SV – 2-6.1 Develop a process for conducting the benchmark audit and calculating the ROI.

SV – 2-6.2 Perform benchmark audit.

SV – 2-6.3 Secure certification that the organization has achieved TMMe level 2.

### **Strategic Objective 2-7**

SO – 2-7 Prepare to progress to level 3 of testing maturity.

### **Supporting Values**

SV – 2-7.1 Re-evaluate the assessment results.

SV – 2-7.2 Develop the level 3 testing business value objectives.

SV – 2-7.3 Perform a risk assessment.

SV – 2-7.4. Calculate the projected ROI for moving to the next maturity level.

SV – 2-7.5 Evaluate whether to move to level 3.

## Level 3

At this level we start improving the processes for validation or dynamic testing. One thing you will notice is that the first strategic objective at each level always is to secure approval and funding to move on to the next level. I cannot emphasize enough how important this approval and support is to the successful implementation. Without senior leadership support you will probably not be successful.

Securing senior leadership support is made easier because of the benchmark audit and calculating ROI that is one of the last strategic objective at level 2. If what you have done at level 2 does not show a business and economic value, then you should not even try to go on to level 3. Conversely, if it has shown business and economic value, then approval to move on to this next level should be much easier to obtain. One thing you need to learn throughout this journey is that testing has to speak the language of business when reporting test results.

### Primary Objective

The primary objective of level 3 is to add professionalism, standardized processes and structure into the validation or dynamic testing of systems. The level 3 improvements will be used on all new projects that are entering the coding or build phase of the life cycle after level 2 certification.

### Strategic Objective 3-1

SO – 3-1 Secure approval and funding to move on to level 3 from senior level management.

### Supporting Values

SV – 3-1.1 Approval should come from the highest level of senior leadership such as, but not limited to, the Chief Executive Officer (CEO), the Chief Operating Officer (COO) and the Chief Financial Officer (CFO).

SV – 3-1.2 Support for the initiative by senior management should be expressed in words, actions and funding.

### Strategic Objective 3-2

SO – 3-2 Establish an independent test organization that reports to the same level of leadership as development.

### Supporting Values

SV – 3-2.1 The test organization should be established with full time testers and support personnel. It should be independent of development and quality assurance.

SV – 3-2.2 The test organization should consist of career ladder positions.

SV – 3-2.3 Develop and execute a training plan for each career ladder position.

### Strategic Objective 3-3

SO – 3 Develop the revised dynamic test measurements and processes for each test application.



### Supporting Values

SV – 3-3.1 Define or revise the dynamic test processes and metrics.

SV – 3-3.2 Baseline the new and revised test processes and metrics.

SV – 3-3.3 Develop processes for using and reporting the metrics.

SV – 3-3.4 Communicate the new and revised processes and metrics to all stakeholders.

### Strategic Objective 3-4

SO – 3-4 Develop test scenario and script processes.

### Supporting Values

SV – 3-4.1 Develop test scenario and script templates to be used on all projects.

SV – 3- 4.2 Write the project test scenarios and scripts using the templates.

SV – 3-4.3 Distribute approved documents to the appropriate individuals.

### Strategic Objective 3-5

SO – 3-5 Implement a formal reporting process that records test status and results real time for each dynamic test.

### Supporting Values

SV – 3-5.1 Develop or purchase an automated process for recording and reporting test status and results.

SV – 3-5.2 Testing reports should support the business value, project management, testing and quality assurance.

SV – 3-5.3 Certify that the project is ready to move to the next phase of testing or development.

### Strategic Objective 3-6

SO – 3-6 Benchmark the level 3 revised processes against both the initial and the level 2 baseline and calculate the return-on-investment (ROI) for improvements.

### Supporting Values

SV – 3-6.1 Develop a process for conducting the level 3 benchmark audit and calculating the ROI.

SV – 3-6.2 Perform benchmark audit.

SV – 3-6.3 Secure certification that the organization has achieved TMMe level 3.

### Strategic Objective 3-7

SO – 3-7 Prepare to progress to level 4 of testing maturity.

### **Supporting Values**

SV – 3-7.1 Re-evaluate the assessment results.

SV – 3-7.2 Evaluate whether the level 3 testing business value objectives have been achieved.

SV – 3-7.3 Evaluate the risk assessment.

SV – 3-7.4. Calculate the projected ROI for moving to the next maturity level.

SV – 3-7.5 Evaluate whether to move to level 4.

## Level 4

At this level we start adding further controls to the testing process, put test documents under configuration control, add more automated testing, launch quality assurance to identify assignable cause defects and to identify and correct post-implementation defects. Again, you will notice that the first strategic objective at this level is to secure approval and funding to move on to level 4.

Like at the previous level, secure senior leadership support to move to level 4 is made easier by the benchmark audit and calculating ROI that is one of the last strategic objective at level 3. If what you have done at level 3 does not show a business and economic value, then you should not even try to go on to level 4. Conversely, if it has shown business and economic value, then approval to move on to level 4 should be easy to obtain.

### Primary Objective

The primary objective of level 4 is to add further controls to the testing process, put test documents under configuration control, add more automated testing, work with quality assurance to identify assignable cause errors and to identify and correct post-implementation defects. The level 4 improvements will be used on all new projects that are entering the life cycle after level 3 certification.

### Strategic Objective 4-1

SO – 4-1 Secure approval and funding to move on to level 4 from senior level management.

### Supporting Values

SV – 4-1.1 Approval should come from the highest level of senior leadership such as, but not limited to, the Chief Executive Officer (CEO), the Chief Operating Officer (COO) and the Chief Financial Officer (CFO).

SV – 4-1.2 Support for the initiative by senior management should be expressed in words, actions and funding.

### Strategic Objective 4-2

SO – 4-2 Establish configuration control on all test documents.

### Supporting Values

SV – 4-2.1 Identify each project test document – for example, test plan, test scenarios, test scripts, defect reports – as a configuration item.

SV – 4-2.2 Each test configuration item should be under version control and stored in the configuration management library

SV – 4-2.3 The same version test documents used in the original testing shall be used when performing regression testing.

### Strategic Objective 4-3

SO – 4.3 Expand the use of automated testing.

### Supporting Values

SV – 4-3.1 Identify the tests that can be automated.

SV – 4-3.2 Explore the commercial availability of automated testing tools.

SV – 4-3.3 Identify which automated tests will need to be programmed.

SV – 4-3.4 Secure and implement automated testing tools.

### Strategic Objective 4-4

SO – 4-4 Expand the defect tracking system to include post-implementation defects.

### Supporting Values

SV – 4-4.1 Forward all post-implementation defects to testing for correction.

SV – 4-4.2 Perform a regression test to assure the defect has been corrected.

### Strategic Objective 4-5

SO – 4-5 Involve the quality assurance (QA) organization in identifying and correcting assignable cause defects.

### Supporting Values

SV – 4-5.1 Forward all defect reports to quality assurance.

SV – 4-5.2 Develop a process to correct assignable cause defects so they don't occur in another project.

SV – 4-5. Develop a process to check to assure the fix to correct assignable cause defects worked.

#### Strategic Objective 4-6

SO – 4-6 Benchmark the new processes against both the initial and the levels 2 & 3 baselines and calculate the return-on-investment (ROI) for improvements.

#### Supporting Values

SV – 4-6.1 Develop a process for conducting the level 4 benchmark audit and calculating the ROI.

SV – 4-6.2 Perform benchmark audit.

SV – 4-6.3 Secure certification that the organization has achieved TMMe level 4.

#### Strategic Objective 4-7

SO – 4-7 Prepare a testing dashboard.

#### Supporting Values

SV – 4-7.1 Link the dashboard to testing tools.

SV – 4-7.2 Make the dashboard available in real-time.

#### Strategic Objective 4-8

SO – 4-8 Prepare to progress to the next level of testing maturity.

### **Supporting Values**

SV – 4-8.1 Re-evaluate the assessment results.

SV – 4-8.2 Evaluate whether the level 4 testing business value objectives have been achieved.

SV – 4-8.3 Calculate the projected ROI for moving to level 5.

SV – 4-8.4 Evaluate whether to move to level 5.



## **Level 5**

When you reach this level the first processes you developed for previous levels are several years old. The average time to reach each level is two years, so that means the processes could be as much as 6 years old. Now is the time to re-evaluate the journey you have been on and make any necessary improvements. It may not seem like this level is important, but it is.

The way a company does business changes over time and processes need to change with the conditions. You constantly want to make improvements in order to maximize the business value and ROI from the test process. Historically, this does not consistently happen. Just as you started this process with an independent unbiased assessment, you are now at the point of performing one again. Just like the initial assessment, this one also needs to look at the whole development process, with special attention to testing.

Again, you will notice that the first strategic objective at level 5 is to secure approval and funding to move on to this level. Things may seem to be moving along smoothly now, but there is no guarantee that with changing conditions that will continue. Usually the level 5 assessment will discover events that you are not aware are happening. The assessment will bring these events and actions to the foreground of attention.

Securing senior leadership support is made easier by the benchmark audit and calculating ROI that is the last strategic objective at each level. If what you have done at level 4 does not show a business and economic value, then you should not even try to go on to level 5. Conversely, if it has shown business and economic value and there has been value at each of the previous levels, then approval to move on to the next level should be very easy to obtain.

### Primary Objective

The primary objective of level 5 is to assess all of the processes that have been implemented to assure they are still providing maximum business value and ROI. You will probably need to make modifications based on business conditions and experience. Remember this is a journey, so you should repeat this assessment every two years at the minimum.

### Strategic Objective 5-1

SO – 5-1 Secure approval and funding to move on to level 5 from senior level management.

### Supporting Values

SV – 5-1.1 Approval should come from the highest level of senior leadership such as, but not limited to, the Chief Executive Officer (CEO), the Chief Operating Officer (COO) and the Chief Financial Officer (CFO).

SV – 5-1.2 Support for the initiative by senior management should be expressed in words, actions and funding.

### Strategic Objective 5-2

SO – 5-2 Perform an independent assessment of the current test process, including the current project approval and development methodology,

### Supporting Values

SV – 5-2.1 The assessment should to be viewed as independent and unbiased by the entire organization in order for the finding to be accepted.

SV – 5-2.2 Use the evaluation to establish a baseline for the current status.

SV – 5-2.3 Compare current status to the baseline established at all prior levels.

SV – 5-2.4 Identify areas that should be improved and make improvement recommendations .

### Strategic Objective 5-3

SO – 5.3 Establish a team to plan the improvements based on the recommendations.

#### Supporting Values

SV – 5-3.1 The planning team should be made up of all stakeholders.

SV – 5-3.2 Present improvement plan to senior management for approval.

SV – 5-3.3 Implement the approved improvement plan.

### Strategic Objective 5-4

SO – 5-4 Benchmark the revised processes against the projected business value and the return-on-investment (ROI) for improvements.

#### Supporting Values

SV – 5-4.1 Develop a process for conducting the level 5 benchmark audit and calculating the ROI.

SV – 5-4.2 Perform the benchmark audit.

SV – 5-4.3 Secure certification that the organization has achieved TMMe level 5.

**Strategic Objective 5-5**

**SO – 5-5** Re-evaluate the level 5 assessment.

**Supporting Values**

SV – 5-5.1 Re-evaluate the assessment results.

SV – 5-5.2 Determine whether the level 5 testing business value objectives have been achieved.

SV – 5-5.3 Schedule periodic assessment to determine the ongoing health of the testing process.

## Conclusion

Test process improvement is a journey. The TMMe just makes that journey easier. Test process improvement should not be considered as being in addition to any other process improvement initiative, but should work in conjunction with that initiative. The TMMe is laid out in incremental steps because that is the best way to make the improvements. Very few companies have the resources to try to do everything at one time. Experience has shown the incremental approach is the most successful.

Just because it is laid out incrementally does not mean that you cannot start working on an improvement at the next level. In fact, this happens quite frequently. For example, I have had companies start work on the level 2 improvements and decided they also needed to begin planning for the independent test organization. It worked out quite well because that is a major organizational change and takes time to plan and implement.

If you would like to discuss the TMMe, or have suggested improvements, please contact me. I look forward to your feedback.

Thomas C. Staab

President

Wind Ridge International, LLC

[tcstaab@windridgeinternational.com](mailto:tcstaab@windridgeinternational.com)

[www.windridgeinternational.com](http://www.windridgeinternational.com)

11321 E. Folsom Point Lane

Franktown, Colorado, USA

303-660-3451 phone

303-660-2057 fax

A three-day highly interactive workshop, *Fundamentals of the Testing Maturity Model Enhanced<sup>TM</sup> (TMMe)*, is offered to further describe the TMMe. It covers the underlying principles of the model, the SSVs, the expected ROI, determining if the TMMe is right for your company, developing an individual action plan and a chance to interact with the developer. **Mention this white paper to receive special pricing.**

**Wind Ridge International, LLC (WRI)**, is an independent consulting firm which specializes in optimizing Information Technology (IT) leadership, resources and processes. **Our mission** is to enable IT leaders to become more successful business leaders.

A few years ago a McKinsey study was reported in *The Economist*. The study showed that if the use of a consultant resulted in only a one-half percentage (0.5%) point increase in management ability, then that would translate into a 2.8% increase in return-on-capital. Our clients also see a return-on-investment (ROI) after using our consulting services. Historically WRI clients see, on average, an initial 10% ROI.

In support of our mission we divide our services into the following categories.

- Consulting
- Training
- Keynote addresses

## About the Author



**Thomas C. Staab**, is President of Wind Ridge International, LLC, an independent consulting firm which specializes in optimizing Information Technology (IT) leadership, resources and processes. It also helps IT leadership overcome their daily challenges. The **WRI mission** is to enable IT leaders to become more successful business leaders.

He is a popular international keynote speaker, management consultant, and trainer. He is internationally recognized for his expertise in:

- Performing independent assessments that defines the challenges facing an organization along with suggested solutions
- Successfully helping client implement the improvements needed to move to the next testing maturity level as quickly as possible
- Training and consulting in all aspects of leadership, quality, testing, software development, process improvement, outsourcing, and multi-generation/multi-cultural workforce
- Maximizing business value

### **Career Highlights:**

- Mr. Staab has over 35 years experience in quality assurance, testing, management, leadership and information technology
- Designed and implemented successful quality assurance, software quality assurance, Total Quality Management and testing processes for major clients
- Helped companies improve their processes to maximize their return-on-investment (ROI)
- Assisted companies maximize their business value

- Internationally recognized expert in both the Testing Maturity Model and the Testing Maturity Model Integration
- Developed a more “real world” testing maturity model called Testing Maturity Model Enhanced (TMMe)

**Professional Achievement Highlights:**

- Bachelor of Arts degree in Sociology
- Master of Science degree in Quality Systems
- Listed in the International Who's Who of Information Technology
- Published over 30 articles
- Dynamic motivational speaker who has presented speeches and keynote addresses at regional, national and world conferences
- Published an e-book “The Real “How-To” on TMM”
- Member of the National Speakers Association, International Speakers Network and the Association of Information Technology Professionals
- Currently working on his new book “Ten Information Technology Challenges for the 21<sup>st</sup> Century