



Design and Process for Trustworthy Software

Process, tools, techniques and
methodology of developing robust
software

AGILENTY CONSULTING GROUP

in collaboration with

**MINNESOTA SECTION OF THE
AMERICAN SOCIETY FOR QUALITY**

Design and Process for Trustworthy Software

Superior design competencies are critical for competing in the contemporary global markets. Outstanding performers such as Apple, Google, Toyota, Nike and Nokia have been exceptional in this regard and have outperformed their competitors over the years. But design's full potential is unleashed only when blended with superior process and people capabilities. Agilent's Design and Process for Trustworthy Software (DPTS) development system provides a framework for leveraging design, process, and people capabilities to build sustainable competitive advantage. DPTS is a blended deployment of Capability Maturity Model Integration (CMMI®) and Design for Trustworthy Software (DFTS) technologies. It provides a powerful platform for meeting customer's cost, quality and delivery expectations in a sustainable and cost effective manner.



The DPTS learning system consists of four differentiated components:

The DPTS Black Belt program is an advanced training program for design and quality professionals associated with software, hardware and systems engineering. The participants acquire in-depth understanding of Capability Maturity Model Integration (CMMI®) and the Design for Trustworthy Software (DFTS) technologies. They learn how CMMI® offers a powerful process infrastructure to build and sustain engineered products and services including software, hardware and systems and its positive impacts on cost, quality, schedule, productivity, and customer satisfaction. It also illustrates how the blended CMMI® and DFTS approach benefits from the strong process infrastructure that CMMI® provides and the architectural and design richness of the award-winning DFTS technology. The program can be offered as an in-house, tailored program for customer organizations.

The DPTS Green Belt program is designed for support professionals in areas like sales, marketing, maintenance, and IT. It is less rigorous than the Black Belt program and is an excellent introduction to DPTS technology for those who would eventually train to be a Black Belt and Master Black Belt.

The Senior Executive seminar is ideal for the senior executive team. This seminar is meant to help understand the broad elements of DPTS technology and its value from business perspective. It also identifies specific responsibilities of senior management team for the flawless deployment and integration of DPTS technology. When implementing a DPTS technology, this is a recommended first step.

The DPTS Master Black Belt (MBB) program is designed for project leaders and executives who provide technical, coaching, mentoring, and leadership support to the project team. MBBs should be proficient to help Black Belts and other engineering and quality professionals in a wide range of product development issues. They undergo the same training classes as Black Belts. In addition, they acquire advanced skills in at least two DPTS bodies of knowledge, such as CMMI®, CoSQ, QFD, TRIZ, FMEA, and Taguchi Methods. Additional advanced training programs for MBBs can be customized for specific organizational needs.

The above four programs are based on a common DPTS body of knowledge clustered in six modules described in the program outline.

Program Outline

The overall DPTS curriculum consists of the following six learning modules:

Module 1: The Challenge of Trustworthy Software

- Part 1: Software Development Methodology Today
- Part 2: Robust Design as Business Strategy
- Part 3: The Challenge of Trustworthy Software
- Part 4: Software Quality Metrics: Robust Design in a Software Context
- Part 5: Financial Perspectives on Trustworthy Software
- Part 6: Organizational Infrastructure and Leadership for DPTS

Module 2: Understanding CMMI-DEV, V1.2

- Part 1: A Brief Introduction to CMMI-DEV 1.2
- Part 2: Components of CMMI-DEV process areas
- Part 3: Understanding Maturity Levels and Capability Levels
- Part 4: Relationships among Process Areas
- Part 5: CMMI Deployment for Process Improvement
- Part 6: Generic Goals and Generic Practices, and the Process Areas

Module 3: CMMI Tools for Acquisition, Services and Appraisals

- Part 1: A Brief Introduction to CMMI-ACQ
- Part 2: A Brief Introduction to CMMI-SVC
- Part 3: SCAMPI Appraisals

Module 4: Focus on the Customer

- Part 1: The Seven Basic Quality (7QC) Tools
- Part 2: The New 7 Management & Planning (7MP) Tools
- Part 3: The Newest 7 Product Planning (7PP) Tools
- Part 4: The Analytic Hierarchy Process (AHP)
- Part 5: Complexity, Mistakes, and Poka Yoke
- Part 6: 5S for Intelligent Housekeeping in Software Development
- Part 7: Software Quality Function Deployment (QFD) and the Voice of the Customer (VoC)



Module 5: Focus on the Process

Part 1: Creativity and Innovation in Software Process

Part 2: Risk Assessment and FMEA in Software

Part 3: Object and Component Technologies and Other Development Tools

Part 4: Deming, Statistical Process Control (SPC), and Software Process Improvement

Part 5: Robust Software in Context

Part 6: Taguchi Methods and Optimization for Robust Software

Part 7: Verification, Validation, Testing, and Evaluation for Trustworthiness

Part 8: Integration, Extension, and Maintenance for Trustworthiness

Module 6: Deploying DPTS Technology

Part 1: Organizational Preparedness

Part 2: Critical Chain Project Management

Part 3: Case Study 1: Lockheed Martin Integrated Systems and Solutions

Part 4: Case Study 2: Motorola

Part 5: DPTS: Value Optimization by Blending CMMI® and DPTS Technologies

Part 6: Implementing DPTS

Course Material

Participants will receive a set of customized course material based on the six program modules, a copy of the American Society for Quality's Crosby

Award-winning book, Design for Trustworthy Software, and other supporting material.

Project Work

The participants for Black Belt and Master Black Belt programs are required to come-up with management-approved projects. They do individual and group work on their projects between the program sessions and subsequently. This is an integral part of developing DPTS competencies in a real-life, organizational context.

How do they learn?

The four differentiated programs enable participants to acquire understanding of various tools, techniques and methodology of CMMI® and DPTS technologies and a framework realizing the benefits of blended deployment in their individual organizational contexts. The individual programs are structured for integrated learning through seminars, instructions, coaching, individual exercises, and group-work as appropriate. The Black Belt and Master Black Belt programs involve application of DPTS tools, techniques and methodology on management-approved projects.



Program Availability

The DPTS programs are available as customized on-site workshops as well as public offerings. Customized programs enhance value and team work and will be considerably more cost effective compared to equivalent public programs.

Who should attend?

The DPTS programs are meant for software, hardware, systems, IT and quality professionals as well as senior executives associated with project, product, and technology management.

How would they benefit?

DPTS Black Belt and Master Black Belt program participants will acquire in-depth and hands-on understanding of the CMMI® and DPTS technologies, the cost, quality and delivery advantages they offer sequentially and realizing the synergistic benefits from blended deployment. They will also benefit from enhanced career prospects associated with learning, certification, and enhanced performance capabilities.

Participants in the Green Belt and Executive programs acquire broad understanding of the DPTS technology for support personnel and executives.

Participating organizations will benefit from positive impacts of CMMI® /DPTS technologies on cost, quality, schedule, productivity, customer satisfaction, and compliance requirements when applicable. It will provide them with a DPTS infrastructure, and tools, techniques and methodology to realize these benefits.

Duration

The DPTS Black Belt program course consists of 30 days of class-room training and learning spread over 6 five-day sessions and is sandwiched with management-approved project work. Content and duration of Green Belt, Senior Executive Seminars and additional Master Black Belt components are customized for specific organizations given their contexts, challenges and opportunities.

Certification and Award

The participants will be awarded DPTS Black Belt, Master Black Belt, and Green Belt Certificates upon successful completion of the program including written tests and project work as applicable. The participants of the Executive Management Seminar would receive certificate of attendance.

DPTS Program Faculty

Dr. Peter Patton is Chairman of Agilent Consulting Group. He has taught at the University of Minnesota, University of Paris, University of Stuttgart, and the University of St. Thomas and has held the position of Chief Information Officer at the University of Pennsylvania. He was Chief Technology Officer at Lawson Software from 1996 to 2002. He has taught, researched and consulted for some 50 years and has engineering and mathematics degrees from Harvard, Kansas, and Stuttgart. He is a recipient of the ASQ Crosby Medal for 2007 for his book *Design for Trustworthy Software*. He is a Master Black Belt in Design for Trustworthy Software (DFTS) Technology and is currently an adjunct professor of engineering with Oklahoma Christian University. His email contact is: peter.patton@oc.edu



Bijay Jayaswal is the CEO of Agilent Consulting Group, LLC. He has held senior executive positions and has consulted in quality and strategy for the last 25 years. His consulting interests include value engineering, process improvement and product development. He has taught engineering and management at the University of Mauritius and California State University, Chico and has directed MBA and Advanced Management programs. He has helped introduce corporate-wide initiatives in re-engineering, Six Sigma, and Design for Six Sigma. He is a recipient of the ASQ Crosby Medal for 2007 for his book *Design for Trustworthy Software*. He is a Master Black Belt in Design for Trustworthy Software (DFTS) Technology and is an adjunct professor of management with Concordia University, St. Paul. He can be reached at: bijay.jayaswal@agilent.com.



Dr. Ernest Forman is a Professor of Decision Sciences at George Washington University's School of Business. He has extensive experience with executive decision-making methodologies, resource allocation, project portfolio management, operations management and statistics. He received one of the first United States patents issued for computer software and designed Expert Choice, a computerized implementation of the Analytic Hierarchy Process, which is now used extensively throughout the United States as well as in Canada, South and Central America, Europe, the Middle East, and the Far East. Applications include a wide range of government and business decisions involving trade-offs among conflicting objectives, some quantitative, some qualitative. Examples of such problems include government policy, source selection, allocation of R&D funds, cost/benefit analysis, employee evaluation, setting corporate priorities, group decision-making, conflict resolution and strategic planning. Dr. Forman's expertise is widely recognized and he is frequently consulted by organizations such as IBM, MERCK, General Motors, Ford, AOL, NIST, Boeing, GAO, IRS, NASA, CIA, DoD, state, and local governments. Dr. Forman holds four U.S. Patents related to decision-making and is co-founder of Expert Choice Inc. He can be reached at forman@gwu.edu.



Richard E. Zultner is an international consultant, educator, author, and speaker. Applying powerful improvement methods, such as QFD, to high-tech software-intensive products and processes has been his primary focus for over ten years. He is a founder and director of the QFD Institute - a nonprofit organization dedicated to the advancement of the theory and practice of QFD. For his pioneering work in Software QFD, he received the International Akao Prize in 1998. He is also a certified "Jonah" in the Theory of Constraints (TOC), and is a Six Sigma Master Black Belt, specializing in Design for Six Sigma. Richard provides consulting and training in Software QFD, Design for Six Sigma, and Critical Chain Project Management. Richard holds a master's degree in management from the J. L. Kellogg Graduate School of Management at Northwestern University, and has professional certifications in quality, project management, software engineering, and theory of constraints. He has taught QFD and Critical Chain project management in the graduate program at Stevens Institute of Technology as an adjunct professor. His email contact is richard@zultner.com.

Design and Process for Trustworthy Software

Developing competencies to:

- Build integrated process models (CMMI®) for software, hardware and systems
- Listen to the voice of the customer for trustworthy design
- Encourage design creativity, innovation, and risk analysis using DFTS technology
- Plan, deliver, maintain, and improve trustworthy software, hardware and systems
- Prepare leadership and infrastructure for DPTS capability and
- Leverage process and design capabilities for sustainable competitive advantage

For more information or to schedule a *Design and Process for Trustworthy Software* program contact:

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