

Applying Agile practices and methodologies together with CMMI process improvement initiatives and/or ISO 9001:2000 compliant Quality Management Systems in the activities of IT-intensive / software development SMEs

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Agile

The project

- Began as a task for Nemetschek as member of the Agile consortium working on Agile software development of embedded systems (EUREKA/ITEA)
- The task - to present a Technical report and mapping between Agile and CMMI practices, Agile practices and ISO 9001 requirements as well as different certification options
- The goal - to suggest a way for the SME, to combine in their activities the best of these worlds
- Target - SMEs
- Is WORK IN PROGRESS!!!! - (very) coarse grained mapping to CMMI Level 2 PA

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Other Agile activities:

- Agile Patterns description:
  - Agile Customer
  - Daily Meetings
  - Iteration Scope
- Pilots:
  - Mobile entertainment (Investigate scrum)
  - Automatic heating systems management (investigate Agile customer management, Xpplanner)
  - Product flow control (Investigate Small team/pair programming, High level customer involvement)

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The background:

- Agile Methodologies
  - SCRUM (management oriented)
  - Crystal Clear (management oriented)
  - XP (engineering practices oriented)
  - Agile certification (for the organization)
- CMMI v1.1
  - General and Specific practices
  - Assessment practices
- ISO 9001
  - Widely recognized - 670 399 certificates worldwide in 154 countries/economies
  - Well established certification schemes

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Scrum

- First applied to software by Ken Schwaber and Jeff Sutherland
- Documented in the book "Agile Software Development with Scrum" by Schwaber / Beedle
- process for developing software :
  - month-long iterations called sprints
  - the work to be done project is listed in the Product backlog
  - at the start of each Sprint a Sprint Planning Meeting is held
  - Product Owner prioritizes the Product Backlog
  - the Scrum team selects the tasks they can complete during the coming Sprint.
  - tasks are then moved to the Sprint Backlog
  - Daily meetings
  - Sprint review meeting at the end of the Sprint
  - Scrum master
  - Scrum team - up to 7-8 people

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Crystal (Clear)

- Developed by Alistair Cockburn
- Documented in "Crystal clear - A human powered Methodology for small teams"
- Size and criticality
  - Quartz - few people working on an invoicing system
  - Diamond - life critical
  - Crystal clear - teams up to 8 people

Life	L6	L20	L40	L100
Essential money	E6	E20	E40	E100
Discretionary money	D6	D20	D40	D100
Comfort	C6 clear	C20 yellow	C40 orange	C100 red

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Agile Crystal Clear 2

- **Crystal clear Strategies**
  - Exploratory 360°
  - Early victory
  - Walking skeleton
  - Incremental re-architecture
  - Information radiators
- **Crystal clear techniques**
  - Methodology shaping
  - Reflection workshop
  - Blitz planning
  - Delphi estimation
  - Daily stand-up meetings
  - Essential Interaction design
  - Process miniature
  - Side-by-side programming
  - Burn Charts

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Agile XP

- Developed by Kent Beck
- Documented in "Extreme Programming Explained", second edition
- Not so prescriptive as the first edition
- Primary practices
- Corollary Practices

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Agile XP 2

- **Primary practices**
  - Sit together
  - Whole team
  - Informative workspace
  - Energized work
  - Pair programming
  - Stories
  - Weekly cycle
  - Quarterly cycle
  - Slack
  - Ten-minute build
  - Continuous integration
  - Test-First programming
  - Incremental design

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Agile XP 3

- **Corollary practices**
  - Real customer involvement
  - Incremental deployment
  - Team continuity
  - Shrinking teams
  - Root cause analysis
  - Shared code / (Collective code ownership).
  - Code and tests
  - Single code base
  - Daily deployment
  - Negotiated scope contract
  - Pay-per-use

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Agile What is ISO 9001:2000

- ISO 9001:2000 specifies requirements for a **quality management system** for any organization
- That organization then can **demonstrate its ability to consistently provide product that meets customer and regulatory requirements**
- The standard is used for certification/registration and contractual purposes by organizations
- To be implemented effectively in IT intensive organizations additional details from other ISO standards:
  - ISO 9003:2004 for software development
  - ISO 10006 for project management
  - ISO 10007 for configuration management
  - ISO 10012 for measurement systems
  - ISO 10013 for quality documentation

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Agile ISO 9001 Requirements

- Five sections
- Organization will describe its activities
- Organizations may exclude the parts of the Product Realization section that are not applicable
- The requirements in the other four sections - apply to all organizations

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### ISO 9001 Sections

- **Quality management system**
  - Quality Manual
  - Control of Documents
  - Control of Records
- **Management responsibility**
  - Management Commitment
  - Customer focus
  - Quality policy
  - Planning
  - Responsibility, Authority and Communication
  - Management review
- **Resource management**
  - Provision of resources
  - Human resources
  - Infrastructure
  - Work environment
- **Product realization**
  - Planning of product realization
  - Customer related processes
  - Design and development
  - Purchasing
  - Product and service provision
  - Control of monitoring
- **Measurements Analysis and Improvement**
  - Monitoring and measurement
  - Control of non-conforming product
  - Analysis of data
  - Improvement

### Mappings 1

- ISO 9001 - CMMI - exist
- CMMI - ISO 9001 - exist
- CMMI - Agile - in progress
- ISO 9001 - Agile - in progress

### Mappings 2 CMMI (ML 2) - Agile

CMMI ML2 PA	Mapping level	Agile practices
• <b>Requirements Management</b>	Largely satisfies	Product backlog, Product owner, Sprint backlog, Customer available, Exploratory 360, Stories, Negotiated scope Contract, Bi-direction traceability is not covered in Agile
• <b>Project planning</b>	Largely satisfies	Sprint planning meeting, Exploratory 360, Backlog planning, Dc/phi estimation, Weekly planning, Quarterly planning, Methodology shaping
• <b>Project Monitoring and Control</b>	Largely satisfies	Sprint review meeting, Daily Scrum, Scrum master, Reflection workshop, Customer available, Daily stand-up meetings, Burn Charts
• <b>Supplier Agreement management</b>	Does not satisfy	
• <b>Measurement and analysis</b>	Largely satisfies	Sprint review meeting, Daily Scrum, Scrum master, Reflection workshop, Customer available, Daily stand-up meetings, Burn Charts
• <b>Process and Product Quality Assurance</b>	Does not satisfy	
• <b>Configuration management</b>	Somewhat satisfies	Sprint planning, Backlog planning, Stories, Weekly cycle, Quarterly cycle, Sprint review meeting, Reflection workshop

### Mappings 3 ISO 9001 - Agile

ISO 9001 clause	Mapping level	Agile practices-patterns
<b>Quality management system</b>	Does not satisfy	
<b>Management responsibility</b>	Does not satisfy	
<b>Resource management</b>	Largely satisfies	Scrum master roles, Exploratory 360, Methodology shaping, SAs by role programming, Pair programming, Sprint planning, Daily meetings, Sprint review meeting, Process adaptation, Team autonomy, Retrospective meeting, Root cause analysis, Work team, Information radiators, SA together, Informative workspaces, Two-minute hold
<b>Product realization</b>	Largely satisfies	Scrum plan - vision, product backlog, Sprint planning meeting, Sprint backlog, Exploratory 360, Backlog planning, Dc/phi estimation, Weekly cycle, Quarterly cycle, Backlog, Product backlog, Product owner prioritizing requirements, Daily stand-up meeting, Incremental/Iterative design, Stories, Back customer service owner, Negotiated scope contract, Sprint review meeting at the end of the Sprint, Backlog not visible, Incremental deploy team, Pay process, Acceptance tests written by users, Customer available, Incremental re-architect, Methodology shaping, Sprint review meeting, Reflection workshop, Code and tests, Continuous integration, Test - Dev programming, Incremental design, Incremental deployment, Daily deploy team
<b>Measurements Analysis and Improvement</b>	Somewhat satisfies	Product Owner practices the Product Backlog, sprint, Sprint review meeting, Sprint Planning Meeting, Backlog review, Working backlog, Reflection workshop, Weekly cycle, Quarterly cycle, Back customer service owner, Incremental deployment, Negotiated scope contract, Pay process, Scrum master, Daily system meeting, Daily meeting, Root cause analysis