Corporate Technology

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The First CMMI-based Appraisal in an Agile Environment at Siemens AG

- Results and Experiences -

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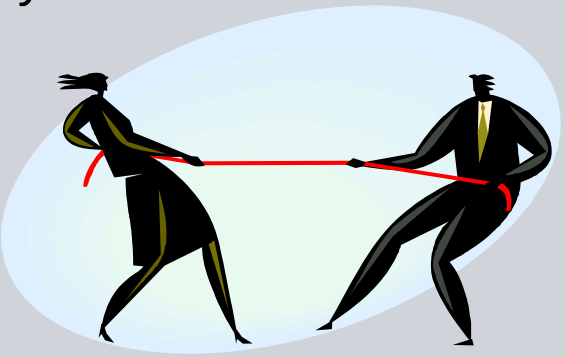

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Motivation

- There is a long standing and strong commitment from Siemens top executives for mature development processes, particularly oriented toward CMMI-DEV:
- Furthermore, there is growing interest in agile approaches and a growing business importance
- This raises the questions:

Are CMMI and Agility compatible?
How will Agility do "through CMMI glasses"?

- A CMMI-based appraisal in an agile environment will gain insight
- *"We assert that Scrum and CMMI together bring a more powerful combination of adaptability and predictability than either one alone."*
  [Scrum and CMMI Level 5 – The Magic Potion for Code Warriors (J. Sutherland, PatientKeeper Inc.; C. R. Jacobsen, Systematic Software Engineering; K. Johnson, Agile Digm Inc.)]

Commonality: Common Goals

Both CMMI and Agility have the same goal:

Developing high-quality products

in the shortest time possible

Both CMMI and Agility report about
significant performance improvements
(e.g. cost, productivity, quality, customer satisfaction),

see e.g. Performance Results of CMMI-based Process Improvements, August 2006,
http://www.sei.cmu.edu/pub/documents/06.reports/pdf/06tr004.pdf
and Shine Technologies, 2003: Agile Methodologies Survey Results
http://www.agilealliance.com/articles/shinetechnologiesagil/file

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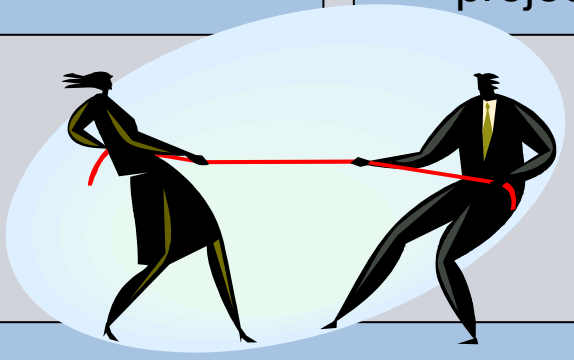
Myths and Misunderstandings

CMMI "guru's'" perception:

- Agile work is ad hoc, chaotic, and undisciplined.
- Agile means no documentation.
- Agile processes are immature and not rigorously followed.

Agile "guru's" perception:

- CMMI means creating tons of unneeded documents.
- CMMI doubles the workload and will slow us down.
- CMMI is only for big "waterfall" projects.



Challenge:

- how to rate agile practices as "expected" CMMI components and/or even adequate alternatives

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Awareness and Preparation: CMMI vs. „Core“ Agile (I)

CMMI	Agile
Project focus on ML 2, organizational focus from ML 3 on	Mainly project focus
Proactive process improvement, based on proposals and measurements	Reactive process improvement, based on experience
Predictability; coordinated, well known changes	Adaptability: frequent changes (usually not formalized by CR)

Potential Agile Gaps:

- All „Organizational“ PA’s
- All GG’s from GG3 up
- Quantitative Project Management
- Causal Analysis and Resolution

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Awareness and Preparation: CMMI vs. „Core“ Agile (II)

CMMI	Agile
Customer trust by process compliance and predictability	Customer trust by regularly delivering tested SW
QA by checking and reviewing the compliance of work products and processes	QA by operating and tested SW (product oriented); “barely sufficient” documentation
Process and document based (written) knowledge	People based (oral) knowledge; self-responsible, self-organizing teams
Plan-driven: predictability allows to prepare a plan and follow it	Planning-driven: frequent change requires frequent re-planning

Potential Agile Gaps:

- Process and Product QA, particularly on processes
- Peer Reviews
- Decision Analysis and Resolution

The Method Used for the Appraisal: The Siemens Process Assessment

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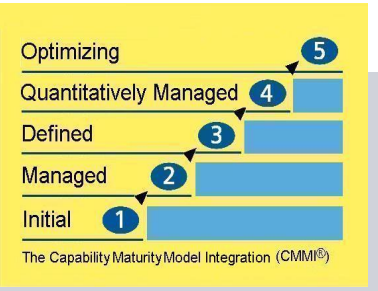

- "Siemens Process Assessment" consists of several methods: The assessment, an "Interim Profile" and an "Improvement Catalyst".
- We used the "Improvement Catalyst" to perform the appraisal. The method is ideally suitable to discover gaps in documented and deployed processes.
- Almost 700 evaluations performed since 1992 (also based on SW-CMM).
- All "Siemens Process Assessment" methods are based on CMMI-DEV v1.2, staged representation (excluding IPPD addition).
- The methods use a dedicated questionnaire (instead of model only) which substantiates and interprets CMMI contents for usage in Siemens context. It contains also non-CMMI material (e.g. safety, re-use, IPR).
- The methods are fit to be used for all engineering disciplines.
- "Siemens Process Assessments" do not claim to be SCAMPI compliant.
- "Siemens Process Assessment" is designed to emphasize textual statements and to give numerous suggestions for improvement.

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Project Boundary Conditions

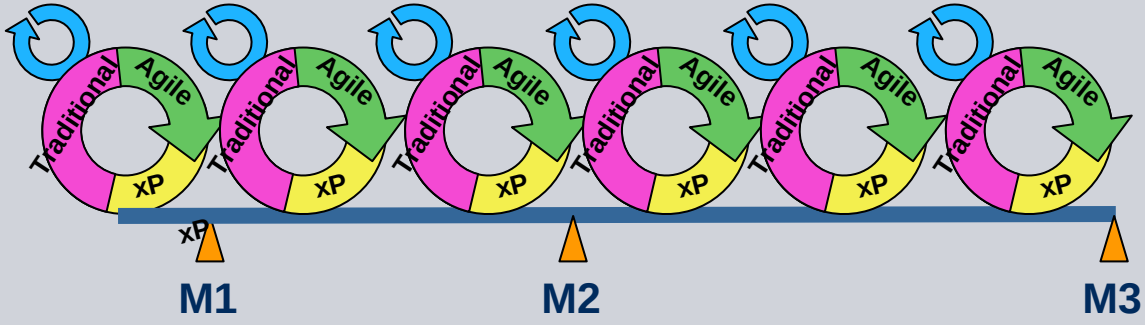
- The appraised project was a sub-project of a larger system development super-project. The larger project followed a waterfall-like process and employed several development sites.

- Characteristics of the sub-project:
  - embedded system development (software development; electronics and mechanical parts delivered by 3rd parties).
  - high level of innovation (new functionality, new technology, new architecture)
  - 40 developers, all at one site (interfaces to the system development project exist)

- Motivation for going agile:
  - address technological project risks through complete realization of risky features in early Sprints
  - increase transparency of project status for higher management and across sub-teams through working product increments in each Sprint

The Project‘s Agile Approach

- “High-level” milestone frame for synchronization with system development
  - Seen as a big challenge, particularly for early freezing of requirements and architecture
- Scrum used as project management methodology (release and Sprint planning, reviews and retrospectives, Daily Scrums…)
- Extreme Programming practices used for engineering activities (continuous integration, pair programming, TDD…)
- “Inherited” traditional practices (e.g. roles, architecture development, reporting) were used to supplement agile practices
- Agile pilot project for this organization; agile processes are not finally settled / documented



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Starting the Agile Appraisal

- The project's motivation for the appraisal:
  - to gain experience
  - to set a first baseline for further process improvement
  - to identify gaps and get recommendations
  - is was not intended as a "benchmark type" (no maturity/capability levels)
  - although Scrum was used, is was *not* intended to include IPPD
- The appraisers' preparation:
  - familiarize with agile methods
  - identify major differences between agile and traditional approaches to understand benefits and limitations
  - recall the spirit and the ideas of CMMI and align with the practices typically found in an agile environment. Be prepared to see different implementations of CMMI practices as in usual appraisals.
- Hint:
  - The results shown are an extract, anonymized and simplified for presentation purposes

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Examples for Detailed Findings

Topic	"Core" Agility	Appraised Project	Recommendations
Roles and responsibilities	Scrum roles (Scrum Master, Product Owner, Team)	Additional "traditional" roles (architect, QA) with own reporting structure	
Risk management	Not explicitly; tech. risks used as a prioritization criterion	Project risks identified and tracked in steering board meetings	Address risk management in team meetings, not only for technological risks
Effort/size estimation	Story points / ideal days; historical data not addressed		Provide definition of story point; analyze estimation accuracy; avoid team overloading
Supplier Agreement Management	-	Usage of super-project process	Define responsibilities and involvement of sub-project

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Examples for Detailed Findings

Topic	"Core" Agility	Appraised Project	Recommendations
Decision Analysis and Resolution	Self-organizing team	Traditional method used for some decisions	Define where traditional method is mandatory
Quality measurements	Required, but not defined	Some measurements (e.g. code coverage)	Define goals for quality measurements, thresholds and clear consequences for mismatch
Process compliance	Within a Scrum team, checked by Scrum master; self-organizing teams	Mainly high-level milestone checks; informal checks on team level	Involve QA closer (as "chicken"); perform regular checks

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Examples for Detailed Findings

Topic	"Core" Agility	Appraised Project	Recommendations
Peer reviews	Pair programming	Not systematic; mainly for code	Ensure systematic pair programming and/or code reviews at least for critical code; plan reviews for documentation and plans; involve interface partners
Requirements traceability	Tasks and acceptance tests derived from requirements	Not always done	Improve traceability from requirements to user stories and then to code, also to test cases; provide support (tool, template)
Architecture	Only general hints (simple design, refactoring, metaphor)	Architecture derived from requirements and documented	Make architecture consolidation a mandatory part of defined milestones

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Examples for Detailed Findings

Topic	"Core" Agility	Appraised Project	Recommendations
Design and code documentation	Coding guidelines	Depends on individual discipline	Define project specific naming conventions, define level of inline documentation
Test	TDD; all tests within one Sprint	System test done by different department; work split not clearly defined	Clarify collaboration of development and system test incl. acceptance criteria
Organizational training	-	Process description, training plan and skill database in place	Collect and evaluate training feedback

Summary

- Appraisers have to understand agility *and* CMMI.
- There was no fundamental contradiction found between agility and CMMI for the maturity/capability levels 2 and 3.
- "Core" agility is a set of principles and values and framework, not a full process model. Therefore some CMMI aspects are not covered.
- To make agility practicable in industrial product development (system development, interfaces to non-agile projects…), it has to be combined/supplemented e.g. with elements from traditional development paradigms.
- This combination has a good chance for a higher maturity.
- The mentioned appraisal methods are suitable to identify gaps in agility "through CMMI glasses". They also help to institutionalize agility, particularly in a larger environment.
- More appraisals on agility and combinations will follow.

☺ *By the way, CMMI may also benefit from agility!*

Thank you for your Attention!

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