SMS Webinar 2010

Tuesday 11th May 2010

# How Lean Organizations Harness Agile to Deliver Business Value

**Your Webinar Host**

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**SMS Exemplar Group**
Specialists in improving business outcomes from software-intensive systems

**SMS Exemplar Ltd.**
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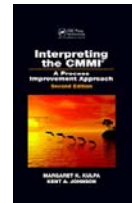Quantity Surveyors of Information Systems

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# Webinar presenter: Kent A. Johnson

- **Chief Technical Officer of AgileDigm, Incorporated**
  - **AgileDigm is an international consulting company that was formed in 2001 to support an agile paradigm for process improvement.**
- **SEI-certified SCAMPI High Maturity Lead Appraiser, an SEI-certified CMMI® instructor, and a Certified ScrumMaster**
- **Has helped clients in over 25 countries to improve their ability to develop products - including one of the world's only Agile Organizations to achieve CMMI Maturity Level 5.**
- **Co-author of *Interpreting the CMMI: A Process Improvement Approach, Second Edition*, Auerbach (2008) and numerous peer reviewed papers on Agile and CMMI.**

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**2**

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How Lean Orgs Harness Agile to Deliver Business Value

# How Lean Organizations Harness Agile to Deliver Business Value

## Webinar with SMS Exemplar
## 11 May 2010

## Kent A. Johnson
## Chief Technical Officer of AgileDigm, Inc.

**SEI**Partner    Scrum Training Institute    © AgileDigm, Inc.

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# Copyright Notices

# Who is AgileDigm?

**AgileDigm, Incorporated** is a US based corporation working with organizations around the world

- – providing consulting, training, and appraisals for organizations that build software-intensive systems
- – Software Engineering Institute (SEI) Partner
- – Scrum Training Institute (STI) Partner

Authors of **Interpreting the CMMI®**, one of the best selling books on using the CMMI.

Unique experience working with one of the only CMMI Maturity Level 5 Agile companies.

® CMMI is registered in the U.S. Patent and Trademark Office by Carnegie Mellon University.
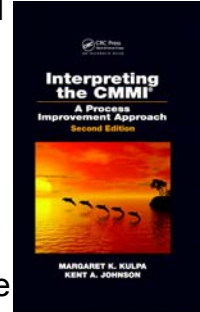SM SCAMPI and SCAMPI Lead Appraiser are service marks of Carnegie Mellon University.

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# Our Message

Agile Methods and Lean Principles can work well with CMMI to deliver Business Value

Goals:

- – Show business value from an effective and efficient Agile CMMI Implementation
- – Identify common root causes of failure
- – Discuss some successes and realized benefits
- – Consider both the team and the enterprise level needs.

# Critical Lean Principles

Four key concepts from lean:

- Eliminate Waste
- Create Knowledge
- Deliver Fast
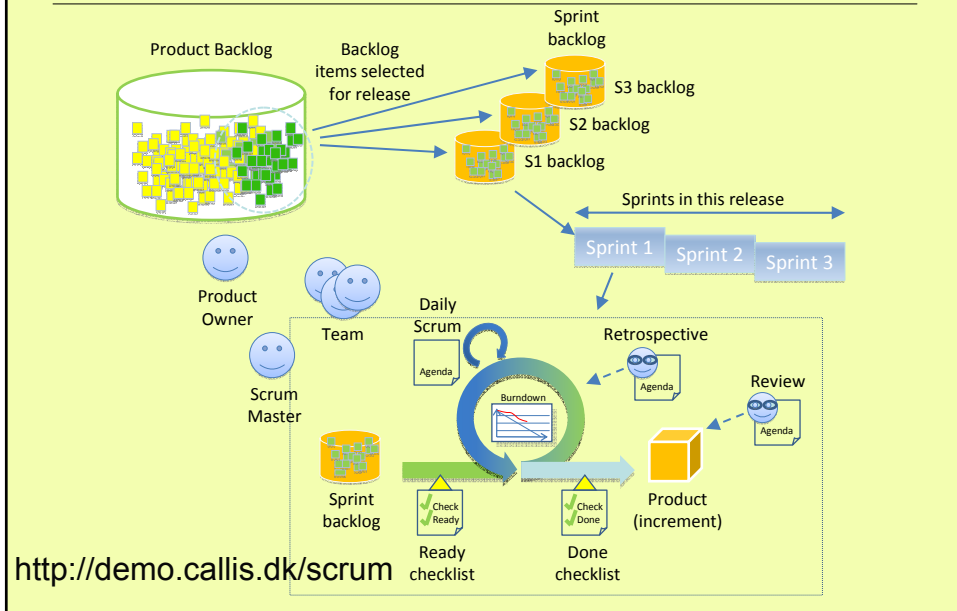- Optimize the Whole (do not sub optimize)

Subset of the seven principles of Lean Software Development from Mary and Tom Poppendieck

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# Agile Methods

- Agile Methods include:
  - Scrum
  - eXtreme Programming
  - Lean Software Development
  - Feature-Driven Development
  - Test-Driven Development
  - and many others
- Lots of available books

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# Scrum as Our Example



http://demo.callis.dk/scrum

# Realized Benefits from Scrum

In Jeff Sutherland's, "Hyperproductive Distributed Scrum Teams" presentation Google TechTalk, July 2008 he documented:

"**Excellent Scrum** – annual revenue **up 400%**
- Patient Keeper
- Others in Scandinavia, "I cannot name"

**Good Scrum** – revenues **up 300%**
- Companies in Scandinavia, "I cannot name"

**Pretty Good Scrum** – revenues **up 150-200%**
- Google 160%
- Systematic Software Engineering 200% *(pre 2008)*

**ScrumBut – revenues up 0-35%**
- Yahoo, most companies"

# CMMI (1/2)

## What the CMMI is:

– CMMI is an acronym for <u>C</u>apability <u>M</u>aturity <u>M</u>odel <u>I</u>ntegration.

– CMMI is a <u>reference model</u> used to help projects and organizations develop and maintain processes.

– CMMI is a collection of <u>best practices</u>.

– CMMI is focused on *process,* not *product*.

**CMMI is based on the idea that the quality of a system is highly influenced by the quality of the process used to acquire, develop, and maintain it.**

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# CMMI (2/2)

## What the CMMI is not:

– CMMI is not "Waterfall".

– CMMI is not a process.

– CMMI is not a standard.

– CMMI is not a process description.

– CMMI is not a mindless set of rules.

## CMMI does not require any particular lifecycle.

**The CMMI cannot be copied as is and serve as an organization's process. You must keep your brains engaged.**

# CMMI Benefits Summary

This is the summary of improvements from all sources collected regardless of maturity levels.

| Category | Improvement | | | Nbr. of Data Points |
|---|---|---|---|---|
| | **Median** | **Lowest** | **Highest** | |
| Cost | 34% | 3% | 87% | 29 |
| Schedule | 50% | 2% | 95% | 22 |
| Productivity | 61% | 11% | 329% | 20 |
| Quality | 48% | 2% | 132% | 34 |
| Customer Satisfaction | 14% | – 4% | 55% | 7 |
| Return on Investment | 4.0 : 1 | 1.7 : 1 | 27.7 :1 | 22 |

Source: *Performance Results of CMMI-Based Process Improvement*, Aug 2006, Technical Report CMU/SEI-2006-TR-004

# Why Effective and Efficient Processes?

- One answer is to deliver "business value", for example
- High Satisfaction for Stakeholders including
  - Customers
  - Team Members
- High Performance
  - Quality Products and Services
  - Extreme Productivity
  - Promised Functionality, On Time, and within Cost
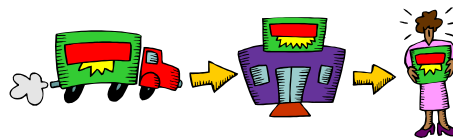
# Agile Manifesto

We are uncovering better ways of developing
software by doing it and helping others do it.
Through this work we have come to value:

**Individuals and interactions** over **processes and tools**
**Working software** over **comprehensive documentation**
**Customer collaboration** over **contract negotiation**
**Responding to change** over **following a plan**

That is, while there is value in the items on
the right, we value the items on the left more.

Don't misread as there is "no value" to the things on the right.
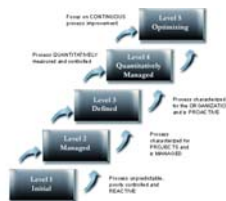
CSM v10.21 © Jeff Sutherland 1993-2009

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# Simple Comparison

| CMMI | Agile Methods |
|---|---|
| • A structured collection of best practices<br>• "What" you should do<br>• Focus in on improving product quality through process performance | • A set of methods that contain detailed steps<br>• "How" you should do it<br>• Focus is on increasing customer satisfaction |

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# Questions?

- Time for some questions?

# Synergy

- Both Agile and CMMI can work, but they have problems
- We look at the problems they each have and what combining does to address these problems.

# Common Failures with Scrum

1. Misunderstanding what Scrum is
   (and is not)
2. Software not tested at end of sprint
   (definition of Done)
3. Backlog not ready at beginning of sprint
   (definition of Ready)
4. Lack of facilitation or bad facilitation
5. Lack of management support
6. Lack of client, customer, or end user
   support

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# Truths about Hyperproductive Scrum

- Everyone must be **trained** in Scrum framework
- Backlog must be **READY** before taking into Sprint
- Software must be **DONE** at the end of the Sprint
- Pair immediately if only one person can do a task
- Physical Scrum Board (or tools with **visible** Scrum Board)
- Short Sprints (often one week)
- Burn down Story points only (no hour burndown)
- **Good engineering practices** (code review, continuous integration, prioritized automated testing in build)
- Everything (including support) is prioritized by Product Owner
- No Multitasking

# Consistent Performance

- Difficulty: Agile often adopted on an ad hoc basis
  - Results in inconsistency across projects
  - Impacts large projects and programs
- Approach: Define Organizational Standard
  - Define organization's Agile processes along with project tailoring guidelines
  - Train staff in defined Agile Processes
  - Using Organizational Process Definition and Organizational Training Process Areas

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# Key CMMI Attributes support Agile

1. Overall Planning and Tracking
2. Training
3. Risk Management
4. Organizational Learning
5. Organizational Visibility
6. Measurement
7. Institutionalization and Compliance

**CMMI brings an Enterprise Level Focus.**

# Common Failures with CMMI

1. <u>Too heavy</u> a process definition
2. Lack of management support
3. Different <u>understandings</u> of mission and goals
4. Process adoption not well planned
5. Process and procedure definition <u>forced on staff</u>
6. Pilots of process <u>too limited</u>

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# Right Level of Process

• Practical processes and work aids contain enough information to be useful.

| Ready Checklist (example) | Done Checklist (example) |
|---|---|
| ✓ Feature is described in enough detail to be understood by team members | ✓ Feature is implemented (for example, code is written) |
| ✓ Feature reviewed and discussed with Product Owner | ✓ Code/Implementation is reviewed |
| ✓ Acceptance Test Criteria defined with Product Owner | ✓ Code/Implementation successfully integrated into build |
| ✓ Required "user" documentation defined or identified | ✓ Required "user" documentation is created and reviewed |
| ✓ Feature estimated by Team (effort & size) | ✓ "All" acceptance tests successfully executed |
| ✓ Feature selected for this sprint (based on Product Owner priority and Team commitment) | ✓ "All" bugs are fixed |
| ✓ Initial tasks defined (for example, write test, refine concept, write code, test) | |

# Success Story

- Systematic A/S is a success story using Scrum and XP in a high maturity CMMI Implementation.
- Addressed their business objectives with
  - doubled productivity
  - cutting defects by 40%
  - on top of years of other CMM and CMMI improvements.
- Reappraised at CMMI Maturity Level 5 in May 2009
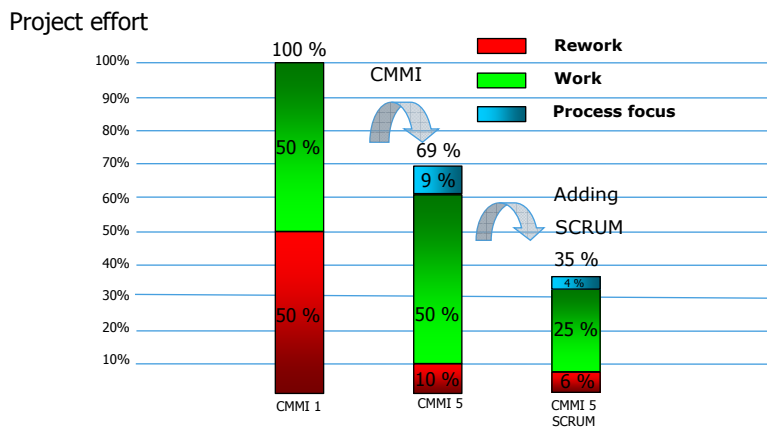- One of the world's first Agile CMMI Maturity Level 5 Companies

"Scrum and CMMI – Going from Good to Great", Carsten Ruseng Jakobsen and Jeff Sutherland, Agile 2009 Conference Chicago, USA August 2009

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# Agile CMMI Performance Analysis

Project effort



**Rework**
**Work**
**Process focus**

CMMI

100 %

50 %

50 %

CMMI 1

69 %

9 %

50 %

10 %

CMMI 5

Adding SCRUM

35 %

4 %

25 %

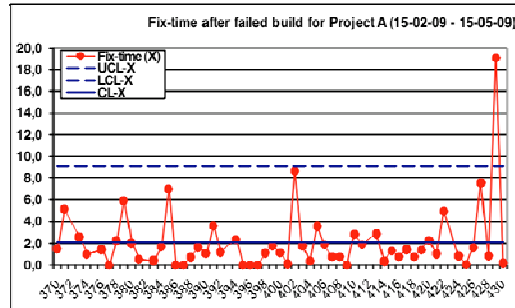6 %

CMMI 5 SCRUM

**Source: Systematic A/S**

# Impediments

- Data driven removal of impediments using control charts

Examples on causes:

- Special competences
- Disk full
- Setup misunderstood
- COTS failed



Fix-time after failed build for Project A (15-02-09 - 15-05-09)

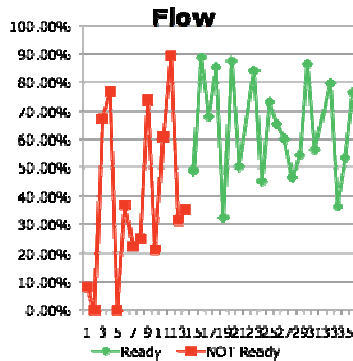- Fix-time (X)
- UCL-X
- LCL-X
- CL-X

**Source: Systematic A/S**

**Root cause analysis of time to fix automatically generates ScrumMaster's impediment list.**

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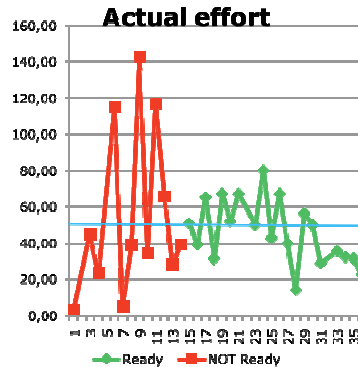# Story Process Efficiency

When work allocated to sprint is READY, flow and stability are achieved



**Flow**

- Ready
- NOT Ready

Objective: 60%



**Actual effort**

- Ready
- NOT Ready

Objective: 50h

**Source: Systematic A/S**

# Questions?

- Time for some questions?

# Enterprise Needs

- Different from the individual teams and include:
  – Change Management
  – Governance and Compliance
  – Organizational Knowledge to build Intellectual Property
  – Institutionalization

# CMMI Maturity Levels

- A maturity level signifies the <u>organizational level of performance</u> that can be expected. The following is the key focus of each maturity level (ML):
  - ML 5 (Optimizing) – continuous process improvement
  - ML 4 (Quantitatively Managed) – quantitative management "by the numbers"
  - ML 3 (Defined) – process standardization and engineering
  - ML 2 (Managed) – basic project management system
  - ML 1 (Initial) – ad hoc processes

**ML 2 provides a foundation for ML 3, ML 3 for ML4, and ML 4 for ML 5.**

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# Nokia Test (1/2)

- Created by Bas Vodde, Nokia Networks in Finland and refined by Jeff Sutherland, co creator of Scrum
- Nine questions with answers between zero and ten (only showing extreme answers in example)

|   | Question | 0 points | 10 points |
|---|----------|----------|-----------|
| 1 | Iterations | No iterations | Fixed 4 weeks or less |
| 2 | Testing | No dedicated testers on team | Software is fully tested and deployed each sprint |
| 3 | Specifications | No Requirements | Good user stories tied to specifications |
| 4 | Product Owner | No Product Owner | Product Owner who motivated team |

# Nokia Test (2/2)

| | Question | 0 points | 10 points |
|---|---|---|---|
| 5 | Product Backlog | No Product Backlog | Single Product Backlog, clearly specified, prioritized, and Product Owner can measure Return on Investment |
| 6 | Estimates | Product Backlog not estimated | Estimates produced by team and estimate error < 10% |
| 7 | Sprint Burndown Chart | No burndown chart | Burndown based on DONE, velocity known, Product Owner plans based on velocity |
| 8 | Team Disruptions | Manager or Project Leader disrupt team | No one disrupting team, only Scrum roles |
| 9 | Team | Tasks assigned to team members | Team in hyperproductive state |

# Quality Assurance (1/3)

- Three general perspectives:
  - Removal of defects found during development through testing.
  - Methods used to verify that a product satisfies a defined set of quality criteria.
  - A planned and systematic means for assuring management that the defined standards, practices, procedures, and methods of the process are applied. **(def'n from CMMI)**

# Quality Assurance (2/3)

- Agile View of Quality
  - Test Driven Development
  - Continuous Product Integration
  - Pair Programming
  - Refactoring
- CMMI View of Quality
  - Institutionalization
  - Audits and Reviews
  - Organizational Visibility

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# Quality Assurance (3/3)

- Both Agile Methods and CMMI have shown a reduction in defects:
  - For example, IBM Australia reported 40 percent reduction in overall defects and 80 percent reduction in Severity 1 problems in moving from Software CMM ML 3 to CMMI ML 5.
  - A study on Pair Programming at Univ. of Utah by Laurie Williams showed a 50% decrease in errors. Pairs were 15% slower than two independent individual programmers.

# Organizational Learning

- Vision
  - The organization obtains knowledge from use of processes by the team, project, program, and enterprise.  This knowledge is shared across the organization.
- CMMI Support for Agile includes:
  - Leveraging experience across the organization
  - Giving people knowledge
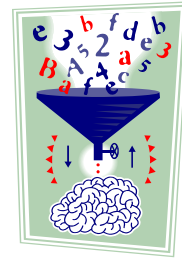
# Institutionalization (1/2)

- Vision
  - Organization institutionalizes practices they find beneficial. ***Institutionalization*** is "the ingrained way of doing business that an organization follows routinely as part of its corporate culture."
- Support for Agile includes:
  - Introducing new methods
  - Ensuring appropriate use of methods
    - This attribute is supported by CMMI generic practices.
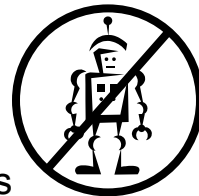
# Institutionalization (2/2)

| | Generic Goal 2 Institutionalize a Managed Process | |
|---|---|---|
| | GP 2.1 | Establish an Organizational Policy |
| | GP 2.2 | Plan the Process |
| | GP 2.3 | Provide Resources |
| | GP 2.4 | Assign Responsibility |
| | GP 2.5 | Train People |
| | GP 2.6 | Manage Configurations |
| | GP 2.7 | Identify and Involve Relevant Stakeholders |
| | GP 2.8 | Monitor and Control the Process |
| | GP 2.9 | Objectively Evaluate Adherence |
| | GP 2.10 | Review Status with High Level Management |
| | Generic Goal 3 Institutionalize a Defined Process | |
| | GP 3.1 | Establish a Defined Process |
| | GP 3.2 | Collect Improvement Information |

GP - Generic Practice

# Conclusion

- Organizations can and have benefited from an Agile CMMI Implementation
  - Obtaining extreme productivity from the combination of agility and discipline
  - Satisfying governance and compliance needs of the enterprise

# Questions?

- Time for some questions?

# Contact Information

**The presentation material in this seminar is copyrighted by AgileDigm, Incorporated, 2010. For further information, please contact:**

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# Follow Up

2-day training course :

**Using Agile with CMMI to get Efficient and Effective Processes**

London 15th/16th June

Registration: www.smsknowledge.co.uk