JAOO, Aarhus, Denmark, 28 Sep 2005

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Certified ScrumMaster Training and Creator of Scrum Process
Chief Technology Officer, PatientKeeper, Inc.
Co-Chair, HL7 Orders and Observations Technical Committee
Co-Investigator, Operating Room of the Future, UMMS
Microsoft Business Framework Advisory Council
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- Agile Systems Architect
  - CTO/VP Engineering for 9 software companies
  - Prototyped Scrum in 4 companies
  - Conceived and executed first Scrum at Easel Corp. in 1993
  - Rolled out Scrum in 5 companies 1993-2005
  - Helped Ken Schwaber roll out Scrum to industry

- Signatory of Agile Manifesto and founder of Agile Alliance

- Available 1/3 time for Scrum training, mentoring, peer review, and consulting
Roots of Scrum

- Team process – Silicon Valley entrepreneurs
- Takeuchi and Nonaka – Japanese manufacturing
- Making the world a better place – inner vision
- Object technology and Easel Smalltalk product
  - OOAD design tool experts, vendors, customers
- Evolutionary biology and complex adaptive systems
- Process and productivity research
  - Software Productivity Research
  - Surgical Team (Mythical Man Month, IBM)
  - Wicked Problems, Righteous Solutions
  - Borland Quatto Pro project
- iRobot – subsumption architecture
Toyota Motor Manufacturing
North America Mission

1. As an American company, contribute to the economic growth of the community and the United States.

2. As an independent company, contribute to the stability and well-being of team members.

3. As a Toyota group company, contribute to the overall growth of Toyota by adding value to our customers.
Scrum Community of Practice

- At start was 80/20 external to internal developers
- Currently ratio has reversed to 20/80
- Scaling # of instructors

Computerworld estimates that over 2/3 of Internet projects in the U.S. use Agile methods, about 167,000 projects. (Sliwa, 2002)
Godfathers of Scrum: Hirotaka Takeuchi and Ikujiro Nonaka


Theory: Scrum Origins

Project Management Styles

Type A – Isolated cycles of work

NASA Waterfall

Type B – Overlapping work

Fuji-Xerox Scrum

Type C – All at once

Honda Scrum

The overlapping of phases does away with traditional notions about division of labor. Takeuchi and Nonaka (1986)
Rugby Scrum
Toyota synthesis of constraints

- Historical assumption is that high quality, product variety, and low cost cannot be achieved simultaneously.
- Toyota production system is based on totally different way of thinking.
- Through knowledge creation by synthesis of contradictions, Toyota pushes the envelope.
- High quality, high variety, and low cost all at once.
Synthesize, not Optimize

Economy of Speed

Economy of Scale/Scope

Bundle

Organic Frontier

Mechanistic Frontier

Unbundle


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What the Customer Wants

Economy of Speed

Economy of Scale/Scope

Contract

Customer Need
Scrum cuts through cost, time, functionality barriers

- Agile process – adapt and inspect
- Iterative, incremental – close to customer
- Used to manage complex projects since 1990;
- Delivers business functionality every 30 days;
- Extremely simple but very hard
We simultaneously want FASTER:
Putnam Process Productivity Index

- \( N = 1.27 \times (N-1) \)
- 33 is 2098 times 1

And BETTER

- Productivity – product backlog requirements completed per 100,000 investment

<table>
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<tr>
<th>Months since Type B Scrum implemented</th>
<th>3</th>
<th>12</th>
<th>24</th>
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<td>Productivity</td>
<td>4.5</td>
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<tr>
<td>Quality</td>
<td>100+</td>
<td>100</td>
<td>5</td>
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Source: Primavera
And MORE for LESS

1. Welcome changing requirements, even late in development.
2. Deliver working software frequently.
3. Business people and developers must work together daily.

Scrum is ITERATIVE, customer can CHANGE requirements, and solution EMERGES through self-organization

Scaling
Planning Developing Implement

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# Cultural Change – The Hard Part

<table>
<thead>
<tr>
<th>Old Organization</th>
<th>New Organization</th>
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<tr>
<td>Centralized</td>
<td>Distributed</td>
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<td>Unified perspective</td>
<td>Diversified perspective</td>
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<td>Original meaning</td>
<td>Emergent meaning</td>
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<td>Analysis to action</td>
<td>Learning by doing</td>
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<td>Redundant</td>
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<td>Certain</td>
<td>Uncertain</td>
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<td>Strategy concept</td>
<td>Local action</td>
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<td>Authoritative</td>
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<tr>
<td>Hierarchical</td>
<td>Flat</td>
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</table>

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Breaking down command and control

- Strategy is developed centrally in traditional companies.
- Emergent strategy self-organizes through local actions.
  - Distributed cognition and actions
- Scrum team must be allowed to self-organize
  - Autonomous
  - Transcendent
  - Cross-fertilization
- Team chooses own work
  - Individuals manage their own work
  - Management gets out of the way
Google strategy:
Getting management out of the way

- When Rosing started at Google in 2001, "we had management in engineering. And the structure was tending to tell people, No, you can't do that." So Google got rid of the managers. Now most engineers work in teams of three, with project leadership rotating among team members. If something isn't right, even if it's in a product that has already gone public, teams fix it without asking anyone. *Agile Principle #5, 9, 12*

- "For a while," Rosing says, "I had 160 direct reports. No managers. It worked because the teams knew what they had to do. That set a cultural bit in people's heads: You are the boss. Don't wait to take the hill. Don't wait to be managed." *Agile Principle #1, 3*

- And if you fail, fine. On to the next idea. "There's faith here in the ability of smart, well-motivated people to do the right thing," Rosing says. "Anything that gets in the way of that is evil." *Agile Principle #5, 12*

*Fast Company. April, 2003.*
Diversified perspective

- Cross-functional teams
- Scrum team has product knowledge, business analysts, user interface design, software engineers, QA
- Advanced Scrum pulls in additional stakeholders – management, customers, installation, and support.
Toyota Prius – emergent strategy

- Revolution in product, technologies, and process
  - Does not fit any product line. Designed for new perspective.
- Uses many technologies
  - Engine, motor, battery, braking combine into hybrid system
- Developed in record time
  - 15 months instead of four years
- Overlapping phases
  - Research, development, design, production
- Leaders built, utilized, and energized “ba”
Concept of **ba:**
*
the zen of Scrum
*

- Dynamic interaction of individuals and organization creates a synthesis in the form of a self-organizing team.
- It provides a shared context in which individuals can interact with each other.
- Team members create new points of view and resolve contradictions through dialogue.
- *Ba* is shared context in motion where knowledge as a stream of meaning emerges.
- *Emergent knowledge codified into working software self-organizes into a product.*
Prius project team managed “Ba”

- Leaders can “find” and utilize spontaneously formed \textit{ba}
- Leaders can build \textit{ba} by providing space for interactions
  - Physical space such as meeting rooms
  - Cyberspace such as computer network
  - Mental space such as common goals
- Fostering love, care, trust, and commitment forms the foundation of knowledge creation (self-organization)
- \textit{Scrum} is based on \textit{TRUTH, TRANSPARENCY, and COMMITMENT}
Energy of ba is given by its self-organizing nature

- *Ba* needs to be “energized” with its own intention, direction, interest, or mission to be directed effectively.
- Leaders provide autonomy, creative chaos, redundancy, requisite variety, love, care, trust and commitment.
- Prius creative chaos was generated by demanding goals. Uchiyamada demanded that his team question every norm on new car development.
- Top management put Prius project team under great time pressure which caused extreme use of simultaneous engineering
- Equal access to information at all levels was critical
- *ScrumMaster* and management must “energize” *ba* through facilitating colocation, dynamic interaction, face to face communication, transparency, and audacious goals.
Every Day, a 15-minute meeting is held, and the SCRUM Master asks the 3 questions:

1) What have you accomplished since the last meeting?
2) Are there any obstacles in the way of meeting your goals?
3) What will you accomplish before the next meeting?

Product Backlog:
Prioritized list of features required by the customer

Sprint Backlog:
Features to be done this sprint. Features are expanded into smaller tasks.

New Functionality is demonstrated at the end of each sprint.

Graphic by Conchango, Ken Schwaber, and Microsoft UK

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We place the highest value on actual implementation and taking action. *Agile Principle #1*

There are many things one doesn’t understand the therefore, we ask them why don’t you just go ahead and take action? *Agile Principle #3, #11*

You realize how little you know and you face your own failures and redo it again and at the second trial you realize another mistake … so you can redo it once again. *Agile Principle #11, #12*

So by constant improvement … one can rise to the higher level of practice and knowledge. *Agile Principle #3*
Toyota way allows for redundancy and failures

- Emergent processes, like biological evolution, produces failures
- Fail early and often for rapid learning and faster evolution
- Rational and efficient approaches to emergent solutions will cause train wrecks
  - Large systems 65% failure rate – Caper Jones, 1993
  - DOD systems 75% failure rate – Jarzombek, 1999
  - UK systems 87% failure rate – Thomas, 2001
Theory: Process

Defined vs. Empirical Process

It is typical to adopt the defined (theoretical) modeling approach when the underlying mechanisms by which a process operates are reasonably well understood. When the process is too complicated for the defined approach, the empirical approach is the appropriate choice.

Uncertainty demands Empirical process control

Inputs
- Requirements
- Technology
- Team

Process

Controls

Outputs
- Incremental product changes

Adapted from *Agile Software Development with Scrum* by Ken Schwaber and Mike Beedle. Courtesy of Mike Cohn, Mountain Goat Software
Local action forces self-organization

- Individual self-organizes work
- Team self-organizes around goals
- Architecture self-organizes around working code
- Product emerges through iterative adaptation
- Requires participative approach as opposed to authoritative approach
- Flat organizational structure
First Scrum – Easel 1993

- Abandoned GANTT charts
- Abandoned job titles
- Created ScrumMaster
- Created Product Owner
- Daily meetings to foster self-organization
- Shielded team from interference during Sprint
- Sprint planning, Sprint review, demo, retrospective
- Agnostic about engineering practices
- Used XP engineering practices
Scrum Influence on eXtreme Programming

From: Kent Beck  To: Jeff Sutherland <jsutherland>
Reply: 70761.1216@compuserve.com
Date: Mon, 15 May 1995 18:01:15 -0400 (EDT)
Subj: HBR paper

Is there a good place to get reprints of the SCRUM paper from HBR? I've written patterns for something very similar and I want to make sure I steal as many ideas as possible.

Kent
Problems / Challenges Adopting & Using Agile

- Lack of Formal Guidelines: 1.77
- Increased Risk of Project Failure: 2.89
- Initial Management Resistance: 3.00
- Inadequate Training: 4.14
- Lack of Peer Support: 4.30
- Organizational Resistance: 4.47
- Extent: 5.37

Dan Turk & Leo Vijayasarathy {dan.turk,leo.vijayasarathy}@colostate.edu (970) 491-0467
154 Rockwell Hall, Department of Computer Information Systems, Colorado State University
Fort Collins, Colorado 80523-1277

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Key Roles and Responsibilities

Product Owner
- Defines the features of the product, decides on release date and content
- Is responsible for the profitability of the product (ROI)
- Prioritizes features according to market value
- Can change features and priority every 30 days
- Accepts or rejects work results

ScrumMaster
- Ensures that the team is fully functional and productive
- Enables close cooperation across all roles and functions and removes barriers
- Shields the team from external interferences
- Ensures that the process is followed. Invites to daily scrum, iteration review and planning meetings

Team
- Cross-functional, seven plus/minus two members
- Selects the iteration goal and specifies work results
- Has the right to do everything within the boundaries of the project guidelines to reach the iteration goal
- Organizes itself and its work
- Demos work results to the Product Owner
Toyota Way applied to best of lean U.S. companies (industrial sensor company)

- 93% reduction in lead time to product
- 83% reduction in work-in-progress inventory
- 91% reduction in finished goods inventory
- 50% reduction in overtime
- 83% improvement in productivity
Toyota is insourcing to the U.S.

- Average reduction in cost by U.S. company outsourcing is 20%.
- Toyota gets 80% gain in productivity with U.S. workers in U.S. manufacturing plants.
- WildCard began insourcing in the U.S. six months after starting Scrum.
  - Acquired within 12 months
  - Major reason was Scrum process
# Lexus \textit{Ba} Creates Market Share

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Climbing out of the tar pit ...
Theory: Scrum Evolution

Type A, B, C Sprints

Type A – Isolated cycles of work

Type B – Overlapping iterations

Type C – All at once

The overlapping of phases does away with traditional notions about division of labor. Takeuchi and Nonaka (1986)
Simultaneous Overlapping Sprints

Red - weekly
Blue - monthly
Green - quarterly

PatientKeeper delivered 45 production releases of quality code to large healthcare systems in 2004.
Project Reporting

320 PR Burndown

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- 320 current open
- 320 current verification
- 320 daily 'closed'
- 320 daily open
- 320 total 'closed'

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Practice: Agility
Using Scrum Type C to Capture Industry Leadership

**Gartner Magic Quadrant**

"PatientKeeper is one of the best-funded and strongest vendors in the mobile/wireless healthcare market. It is one of the few to market itself as providing a mobile computing infrastructure and development environment for which it, and other vendors, system integrators and users, can develop their own mobile applications. It supports both the Palm and Pocket PC platforms."

— Ken Kleinberg, Gartner Research
Questions?
References


