CSE 435
Scrum and Agile Software Development

Reading:

Scrum Primer,
by Deemer/Benefield/Larman/Vodde

slides originally created by Marty Stepp
http://www.cs.washington.edu/403/
Modified by Dennis Phillips, Michigan State University

What is Scrum?

Scrum:  It’s about common sense

- Is an agile, lightweight process
- Can manage and control software and product development
- Uses iterative, incremental practices
- Has a simple implementation
- Increases productivity
- Reduces time to benefits
- Embraces adaptive, empirical systems development
- Is not restricted to software development projects

- Embraces the opposite of the waterfall approach...
Scrum Origins

- **Jeff Sutherland**
  - Initial scrums at Easel Corp in 1993
  - IDX and 500+ people doing Scrum

- **Ken Schwaber**
  - ADM
  - Scrum presented at OOPSLA 96 with Sutherland
  - Author of three books on Scrum

- **Mike Beedle**
  - Scrum patterns in PLOPD4

- **Ken Schwaber and Mike Cohn**
  - Co-founded Scrum Alliance in 2002, initially within Agile Alliance

Agile Manifesto

<table>
<thead>
<tr>
<th>Individuals and interactions</th>
<th>over</th>
<th>Process and tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working software</td>
<td>over</td>
<td>Comprehensive documentation</td>
</tr>
<tr>
<td>Customer collaboration</td>
<td>over</td>
<td>Contract negotiation</td>
</tr>
<tr>
<td>Responding to change</td>
<td>over</td>
<td>Following a plan</td>
</tr>
</tbody>
</table>

Source: www.agilemanifesto.org
### Project Noise Level

![Diagram showing the project noise level with axes for requirements and technology, indicating areas of far from agreement, close to agreement, complicated, complex, and anarchy.]

Source: Strategic Management and Organizational Dynamics by Ralph Stacey in Agile Software Development with Scrum by Ken Schwaber and Mike Beedle.

### Scrum at a Glance

![Diagram illustrating the Scrum process with a product backlog, sprint backlog, daily scrum meeting, backlog tasks expanded by team, 24 hours, 30 days, and a potentially shippable product increment.]

Source: Adapted from Agile Software Development with Scrum by Ken Schwaber and Mike Beedle.
Sequential vs. Overlap

Rather than doing all of one thing at a time...

...Scrum teams do a little of everything all the time

Scrum Framework

Roles
- Product owner
- Scrum Master
- Team

Ceremonies
- Sprint planning
- Sprint review
- Sprint retrospective
- Daily scrum meeting

Artifacts
- Product backlog
- Sprint backlog
- Burndown charts
Scrum Roles

- **Product Owner**
  - Possibly a Product Manager or Project Sponsor
  - Decides features, release date, prioritization, $$$

- **Scrum Master**
  - Typically a Project Manager or Team Leader
  - Responsible for enacting Scrum values and practices
  - Remove impediments / politics, keeps everyone productive

- **Project Team**
  - 5–10 members; Teams are self-organizing
  - Cross-functional: QA, Programmers, UI Designers, etc.
  - Membership should change only between sprints

"Pigs" and "Chickens"

- **Pig:** Team member committed to success of project
- **Chicken:** Not a pig; interested but not committed

A pig and a chicken are walking down a road. The chicken looks at the pig and says, "Hey, why don't we open a restaurant?" The pig looks back at the chicken and says, "Good idea, what do you want to call it?" The chicken thinks about it and says, "Why don't we call it 'Ham and Eggs'?" "I don't think so," says the pig, "I'd be committed but you'd only be involved."
**Sprint Planning Mtg.**

- **Sprint planning meeting**
  - **Sprint prioritization**
    - Analyze/evaluate product backlog
    - Select sprint goal
  - **Sprint planning**
    - Decide how to achieve sprint goal (design)
    - Create sprint backlog (tasks) from product backlog items (user stories / features)
    - Estimate sprint backlog in hours

**Daily Scrum Meeting**

- **Parameters**
  - Daily, ~15 minutes, Stand-up
  - Anyone late pays a $1 fee

- **Not for problem solving**
  - Whole world is invited
  - Only team members, Scrum Master, product owner, can talk
  - Helps avoid other unnecessary meetings

- Three questions answered by each team member:
  1. What did you do yesterday?
  2. What will you do today?
  3. What obstacles are in your way?
Scrum's Artifacts

• Scrum has remarkably few artifacts
  – Product Backlog
  – Sprint Backlog
  – Burndown Charts

• Can be managed using just an Excel spreadsheet
  – More advanced / complicated tools exist:
    • Expensive
    • Web-based – no good for Scrum Master/project manager who travels
    • Still under development

Product Backlog

• The requirements
• A list of all desired work on project
• Ideally expressed as a list of user stories along with "story points", such that each item has value to users or customers of the product
• Prioritized by the product owner
• Reprioritized at start of each sprint
User Stories

• Instead of Use Cases, Agile project owners do "user stories"
  – **Who** (user role) – Is this a customer, employee, admin, etc.?
  – **What** (goal) – What functionality must be achieved/developed?
  – **Why** (reason) – Why does user want to accomplish this goal?

  **As a [user role], I want to [goal], so I can [reason].**

• Example:
  – "As a user, I want to log in, so I can access subscriber content."

• **story points**: Rating of effort needed to implement this story
  – common scales: 1–10, shirt sizes (XS, S, M, L, XL), etc.

Sample Product Backlog

<table>
<thead>
<tr>
<th>Backlog item</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allow a guest to make a reservation</td>
<td>3 (story points)</td>
</tr>
<tr>
<td>As a guest, I want to cancel a reservation.</td>
<td>5</td>
</tr>
<tr>
<td>As a guest, I want to change the dates of a reservation.</td>
<td>3</td>
</tr>
<tr>
<td>As a hotel employee, I can run RevPAR reports (revenue-per-available-room)</td>
<td>8</td>
</tr>
<tr>
<td>Improve exception handling</td>
<td>8</td>
</tr>
<tr>
<td>...</td>
<td>30</td>
</tr>
<tr>
<td>...</td>
<td>50</td>
</tr>
</tbody>
</table>
Sample Product Backlog 2

### Product Backlog
**Estimating System Upgrade**

<table>
<thead>
<tr>
<th>Sprint ID</th>
<th>Backlog Item</th>
<th>Owner</th>
<th>Estimated Days</th>
<th>Remaining Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Remove user story in sprite</td>
<td>BC</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Remove objectInitialVersionSize from disciplines pas</td>
<td>BC</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Create &quot;Legacy&quot; discipline module with old civil and E.I. content</td>
<td>BC</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Augment each tbl operation to support network operation</td>
<td>BC</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>Extend Engineering Design estimate items to include summaries</td>
<td>BC</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Supervision/Guidance</td>
<td>CAM</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Remove CSDL/property from AppConfig class in globals.pas</td>
<td>BC</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Remove UOC constants in globals.pas and main.pas</td>
<td>BC</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>New EBI section doesn't have EBI.png</td>
<td>BC</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Delay in main releases don't appear to be required</td>
<td>BC</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Undo modifications to Other Major Equipment in formExcel.pas</td>
<td>BC</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Add ACS form to be added on the screen</td>
<td>BC</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Extend DUnit tests to all UI discipline</td>
<td>BC</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

### Sprint Backlog

- Individuals sign up for work of their own choosing
  - Work is never assigned
- Estimated work remaining is updated daily

- Any team member can add, delete change sprint backlog
- Work for the sprint emerges
- If work is unclear, define a sprint backlog item with a larger amount of time and break it down later
- Update work remaining as more becomes known
Sample Sprint backlog

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code the user interface</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Code the middle tier</td>
<td>16</td>
<td>12</td>
<td>10</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Test the middle tier</td>
<td>8</td>
<td>16</td>
<td>16</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Write online help</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Write the Foo class</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Add error logging</td>
<td>8</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sprint Burndown Chart

- A display of what work has been completed and what is left to complete
  - one for each developer or work item
  - updated every day
  - (make best guess about hours/points completed each day)

- variation: Release burndown chart
  - shows overall progress
  - updated at end of each sprint

Sample Burndown Chart
<table>
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<td>8</td>
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<td></td>
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<td>16</td>
<td>12</td>
<td>10</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Test the middle tier</td>
<td>8</td>
<td>16</td>
<td>16</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Write online help</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Burndown Example 1**

No work being performed
Burndown Example 2

Work being performed, but not fast enough

Burndown Example 3

Work being performed, but too fast!
The Sprint Review

- Team presents what it accomplished during the sprint
- Typically takes the form of a demo of new features or underlying architecture
- Informal
  - 2-hour prep time rule
  - No slides
- Whole team participates
- Invite the world

Scalability

- Typical individual team is 7 ± 2 people
  - Scalability comes from teams of teams

- Factors in scaling
  - Type of application
  - Team size
  - Team dispersion
  - Project duration

- Scrum has been used on multiple 500+ person projects
Scaling: Scrum of Scrums

Scrum vs. Other Models

Process Comparison

<table>
<thead>
<tr>
<th></th>
<th>Waterfall</th>
<th>Spiral</th>
<th>Iterative</th>
<th>SCRUM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Defined processes</strong></td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Planning &amp; Closeout only</td>
</tr>
<tr>
<td><strong>Final product</strong></td>
<td>Determined during planning</td>
<td>Determined during planning</td>
<td>Sat during project</td>
<td>Sat during project</td>
</tr>
<tr>
<td><strong>Project cost</strong></td>
<td>Determined during planning</td>
<td>Partially variable</td>
<td>Sat during project</td>
<td>Sat during project</td>
</tr>
<tr>
<td><strong>Completion date</strong></td>
<td>Determined during planning</td>
<td>Partially variable</td>
<td>Sat during project</td>
<td>Sat during project</td>
</tr>
<tr>
<td><strong>Responsiveness to environment</strong></td>
<td>Planning only</td>
<td>Planning primarily</td>
<td>At end of each iteration</td>
<td>Throughout</td>
</tr>
<tr>
<td><strong>Team flexibility, creativity</strong></td>
<td>Limited - cookbook approach</td>
<td>Limited - cookbook approach</td>
<td>Limited - cookbook approach</td>
<td>Unlimited during iterations</td>
</tr>
<tr>
<td><strong>Knowledge transfer</strong></td>
<td>Training prior to project</td>
<td>Training prior to project</td>
<td>Training prior to project</td>
<td>Teamwork during project</td>
</tr>
<tr>
<td><strong>Probability of success</strong></td>
<td>Low</td>
<td>Medium Low</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>
Credits, References

- Mike Cohn, Mountain Goat Software
  www.mountaingoatsoftware.com
- Scrum and The Enterprise by Ken Schwaber
- Succeeding with Agile by Mike Cohn
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