Planning and Tracking Agile Projects

Mike Cohn - background

Consultant, author, and speaker

- Founding member and director of Agile Alliance, Scrum Alliance, and Agile Project Leadership Network
- Founder of Mountain Goat Software
Imagine...

- That you’re fed up with software development as a career
- And you decide to go into the landscaping business
- Your first job is moving this pile of rock from the front of my house to the back

How might you estimate this?

- One way:
  - Look at the pile of rock and estimate how many wheelbarrow loads it represents
  - After an hour, see how many wheelbarrow loads you’ve moved then extrapolate the total duration

- I think that’s 80 wheelbarrow loads
- After an hour I’ve moved 20 loads
- So, I’ll be done in a total of 4 hours
My landscaping

Wheelbarrow Loads

Time

0900 1000 1100 1200 1300

• An iteration is a short, constrained period of time
• Typically 1-4 weeks

Velocity is the amount of work planned or completed in an iteration.

A release typically comprises more than one iteration

Monday, March 19, 2007
The planning onion

- Agile teams plan at the innermost three levels.
- Others (on the team in the company) plan at the outer levels.

Relating the different planning levels

<table>
<thead>
<tr>
<th>Product Backlog</th>
<th>Iteration Backlog</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iteration 1</td>
<td></td>
</tr>
<tr>
<td>As a frequent flyer, I want to...</td>
<td>Code the UI 8</td>
</tr>
<tr>
<td>As a frequent flyer, I want to...</td>
<td>Write test fixture 6</td>
</tr>
<tr>
<td>As a frequent flyer, I want to...</td>
<td>Code middle tier 12</td>
</tr>
<tr>
<td>As a frequent flyer, I want to...</td>
<td>Write tests 5</td>
</tr>
<tr>
<td>As a frequent flyer, I want to...</td>
<td>Automate tests 4</td>
</tr>
<tr>
<td>Iteration 2</td>
<td></td>
</tr>
<tr>
<td>As a frequent flyer, I want to...</td>
<td></td>
</tr>
<tr>
<td>As a frequent flyer, I want to...</td>
<td></td>
</tr>
<tr>
<td>As a frequent flyer, I want to...</td>
<td></td>
</tr>
</tbody>
</table>

“Yesterday I started on the UI; I should finish before the end of today.”
An agile approach to planning

**Release**
- Conditions of Satisfaction (scope, schedule, resources)
  - Release planning

**Iteration**
- Conditions of Satisfaction (scope)
  - Iteration planning
  - Development
  - Product increment

Feedback loop

**Agenda**
- Estimating
- Release planning
- Burndown charts

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Story points

- Probably the most commonly used estimating unit among agile teams today
  - Name is derived from agile teams commonly expressing requirements as “user stories”
- Based on a combination of the size and complexity of the work
- Unitless but numerically relevant estimates
  - A 10-point user story is expected to take twice as long as a 5-point user story

Consider these two piles of work

What story point values might we put on these?
Zoo points

Assign “zoo points” to the following breeds:

- Lion
- Kangaroo
- Rhinocerus
- Bear
- Giraffe
- Gorilla
- Hippopotamus
- Tiger

Three key advantages

- Estimating in story points:
  1. Forces the use of relative estimating
     - Studies have shown we’re better at this
  2. Focuses us on estimating the size, not the duration
     - We derive duration empirically by seeing how much we complete per iteration
  3. Puts estimates in units that we can add together
     - Time based estimates are not additive

Comparing apples to apples

Planning poker for estimating

- An iterative approach to estimating, loosely based on wideband Delphi
- Steps
  1. Each estimator is given a deck of cards, each card has a valid estimate written on it
  2. Customer/Product owner reads a story and it's discussed briefly
  3. Each estimator selects a card that's his or her estimate
  4. Cards are turned over so all can see them
  5. Discuss differences (especially outliers)
  6. Re-estimate until estimates converge
Planning poker - an example

<table>
<thead>
<tr>
<th>Estimator</th>
<th>Round 1</th>
<th>Round 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susan</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Vadim</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Ann</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Chris</td>
<td>5</td>
<td>8</td>
</tr>
</tbody>
</table>

Estimate these

<table>
<thead>
<tr>
<th>Product backlog item</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read a high-level, 10-page overview of agile software development in <em>People</em> magazine.</td>
<td></td>
</tr>
<tr>
<td>Read a densely written 5-page research paper about agile software development in an academic journal.</td>
<td></td>
</tr>
<tr>
<td>Write the product backlog for a simple eCommerce site that sells only clocks.</td>
<td></td>
</tr>
<tr>
<td>Recruit, interview, and hire a new member for your team.</td>
<td></td>
</tr>
<tr>
<td>Create a 60-minute presentation about agile estimating and planning for your coworkers.</td>
<td></td>
</tr>
<tr>
<td>Wash and wax your boss' Porsche.</td>
<td></td>
</tr>
<tr>
<td>Read a 150-page book on agile software development.</td>
<td></td>
</tr>
<tr>
<td>Write an 8-page summary of that book for your boss.</td>
<td></td>
</tr>
</tbody>
</table>
Why planning poker works

- Those who will do the work, estimate the work¹
- Estimators are required to justify estimates²,³
- Focuses most estimates within an approximate one order of magnitude⁴,⁵

Reduces impact of irrelevant information

**Group A**
- Given project spec.
- 20 hours

**Group B**
- Given same spec but with estimation-irrelevant details added:
  - end users’ desktop applications
  - user passwords,
  - etc.
- 39 hours

Source: *How to avoid impact from irrelevant and misleading information on your cost estimates*, Magne Jørgensen and Stein Grimstad, Simula Research Laboratory, Simula Research Labs Estimation Seminar, Oslo, Norway 2006.

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Specification length

**Group A**
- Given a one-project spec.
- 117 hours

**Group B**
- Given a spec with exactly the same text but was 7 pages long
- Increased length achieved through:
  - double line space
  - wide margins
  - larger font size
  - more space between paragraphs
- 173 hours

Source: *How to avoid impact from irrelevant and misleading information on your cost estimates*, Magne Jørgensen and Stein Grimstad, Simula Research Laboratory, Simula Research Labs Estimation Seminar, Oslo, Norway 2006.
Extra requirements

**Group A**
- Given requirements R1–R4
- 4 hours

**Group B**
- Given requirements R1–R5
- 4 hours

**Group C**
- Given requirements R1–R5
- but told to estimate R1–R4 only
- 8 hours!

Source: How to avoid impact from irrelevant and misleading information on your cost estimates, Magne Jørgensen and Stein Grimstad, Simula Research Laboratory, Simula Research Labs Estimation Seminar, Oslo, Norway 2006.

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Reduces likelihood of anchoring

**Control group**
- Given a product spec
- 456 hours

**High anchor group**
- Given the same product spec
- Told the customer thinks 500 hours is a reasonable estimate but that
  - The customer knows very little about the implications of his spec on the estimate
  - You shouldn’t let his number influence you
- 555 hours

**Low anchor group**
- Same as high but customer thinks 50 hours
- 99 hours

Source: How to avoid impact from irrelevant and misleading information on your cost estimates, Magne Jørgensen and Stein Grimstad, Simula Research Laboratory, Simula Research Labs Estimation Seminar, Oslo, Norway 2006.

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**Agenda**

- ✔ Estimating
- ☐ Release planning
- ☐ Burndown charts

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**Release planning**

**Purpose**

To answer questions such as:
- How much will be done by 30 June?
- When can we ship with this set of features?
- How many people or teams should be on this project?

**Inputs**

- Velocity
- The length of the project
- Prioritized product backlog
An example with velocity=14

Updating the release plan

- Use multiple views of observed velocity

- Last Observation = 36
- Mean (Last 8) = 33
- Mean (Worst 3) = 28

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Extrapolate from velocity

- At our slowest velocity we’ll finish here
- At our long-term average we’ll finish here
- At current velocity we’ll finish here

Agenda

- Estimating
- Release planning
- Burndown charts

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How’s my landscaping coming?

![Graph showing a burndown chart](image)

This is called a burndown chart.

Remember the different levels?

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<td>8</td>
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<td>As a frequent flyer,</td>
<td>Write test fixture</td>
</tr>
<tr>
<td>I want to...</td>
<td>6</td>
</tr>
<tr>
<td>As a frequent flyer,</td>
<td>Code middle tier</td>
</tr>
<tr>
<td>I want to...</td>
<td>12</td>
</tr>
<tr>
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<tr>
<td>I want to...</td>
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**We can track burndown at both levels**

*Day I started on the UI; I should finish before the end of today.*

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An iteration burndown chart

A release burndown chart

Four Lessons
- Burndown charts:
  - Show net progress
  - Raise questions; they don't answer them
  - Facilitate early discussions
  - Make it impossible to lie
Mike Cohn contact info

mike@mountaingoatsoftware.com
www.mountaingoatsoftware.com
(720) 890-6110 (office)
(303) 810-2190 (mobile)