The Value Uncertainty Game

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Purpose

A fun game to explore how risk and uncertainty impacts our decisions and behaviours in software development.
Establishing Norms
Introduce yourself to your new team
Create a team name
(1 minute)
Goal of the Game

• Produce a Software Release in 3 iterations of 10 days per iteration
• Prioritize and re-prioritize the backlog to optimize value delivery before the fixed release date
• Be the team that delivers the most points
  – Delivered Value + “Commitment Points”
Artifacts (5)

ID: 1

**Test:** Roll 3 dice - 2 or more dice are the same

**Value:** Sum of all dice

10 User Stories

---

Value – Uncertainty Estimation Matrix

<table>
<thead>
<tr>
<th>XL</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| S  | M  | L  | XL |

---

1 Score Card – Write Your Team’s Number at the Top

Value: Sum of Col B:Col K where >0 if Col M >= Col A, else “No”

If Col N == “Yes”, then 5 * Col A, else 0

Commitment Points

Subtotal: Roll Value

Accepted

<table>
<thead>
<tr>
<th>Iteration</th>
<th>Commitment Met? (Yes/No)</th>
<th># Stories Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iteration 1</td>
<td>Yes/No</td>
<td># Stories Committed to Iteration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Iteration</th>
<th>Iteration Plan</th>
<th>In Progress (WIP = 1)</th>
<th>Accepted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iteration 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Scrum Board
Roles (3)

- Score Keeper – Update the score sheet after each day of the iteration
- Sticky Minder – Move the Stories, keep the Scrum Board up-to-date
- Dice Roller – Rolls the Dice
Example Story

ID: 1

Test: Roll 3 dice - 2 or more dice are the same

Value: Sum of all dice

Day 1:

Fail; Story Not Accepted

Day 2:

Success; Story Completed

Cost = 2 days
Value = 3 + 1 + 3 = 7
Example: Relative Sizing

**ID 1**

Value: Sum of all dice

Test: Roll 3 dice – 2 or more dice are the same

**ID: 4**

Value: product of dice

Test: Roll 3 dice - Three consecutive integers (straight)

Which story has a higher potential value?

Product > Sum

Which story has a higher potential cost?

Pr(3 consecutive integers) < Pr(2 or more dice are the same)
Clarification

ID: 5

Test: Roll 3 dice – no 1s and no 2s

Value: Sum of all dice

Meaning: None of the 3 dice are 1s or 2s
Release Planning
### Estimation and Prioritization:

**Place stories by relative cost and value**

<table>
<thead>
<tr>
<th>Value</th>
<th>XL</th>
<th></th>
<th></th>
<th></th>
<th>ID: 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ID: 1</td>
</tr>
<tr>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost</th>
<th>S</th>
<th>M</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S</td>
<td>M</td>
<td>L</td>
</tr>
</tbody>
</table>
Mini-Retro

• How is this like estimating in software?
• How is it not like estimating in software?
• What can we learn from this?
Goal: Prioritize the backlog to maximize your team’s score by the end of the release.
Release planning

• Must Commit to at least 6 stories
  – For each story committed and delivered you will get 10 commitment points
  – If you miss your commitment you will get 0 commitment points.
Plan the Release

Must commit a minimum of 6 stories for the release

You can choose to commit more, but you forfeit all commitment points for the release if you miss any committed story.
Iteration Planning
Stories and Scoring

- Release is 3 iterations,
  - 10 “days” per iteration.
  - 1 Roll of the dice per day

- WIP limit of one story in progress at a time

- You can earn 5 extra “commitment” points for each COMMITTED story you deliver.
  - Forfeit all commitment points for an iteration if any committed stories are missed.

- Must commit to AT LEAST 2 stories per iteration.

- You may choose to commit to more – BUT you lose ALL commitment points for that iteration if you miss ANY commitment.

- Score = Delivered Value + Commitment Points
Plan the First Iteration

Must commit a minimum of 2 stories to each iteration

You can choose to commit more, but you forfeit all commitment points for that iteration if you miss any
Simulation Example

ID: 1

**Test:** Roll 3 dice - 2 or more dice are the same

**Value:** Sum of all dice
<table>
<thead>
<tr>
<th>Iteration</th>
<th># Stories Committed to Iteration</th>
<th>Roll (Day) 1</th>
<th>Roll (Day) 2</th>
<th>Roll (Day) 3</th>
<th>Roll (Day) 4</th>
<th>Roll (Day) 5</th>
<th>Roll (Day) 6</th>
<th>Roll (Day) 7</th>
<th>Roll (Day) 8</th>
<th>Roll (Day) 9</th>
<th>Roll (Day) 10</th>
<th>Total of Accepted Value</th>
<th># Stories Completed</th>
<th>Iteration Commitment Met?(Yes/No)</th>
<th>Commitment Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ID: 1

Test: Roll 3 dice - 2 or more dice are the same

Value: Sum of all dice

![Dice Image]
<table>
<thead>
<tr>
<th>Iteration</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>X X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ID: 1**

**Test:** Roll 3 dice - 2 or more dice are the same

**Value:** Sum of all dice
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<th>Commitment Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>3 x x 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ID: 1**

**Test:** Roll 3 dice - 2 or more dice are the same

**Value:** Sum of all dice
<table>
<thead>
<tr>
<th>Iteration</th>
<th># Stories Committed to Iteration</th>
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<th>Commitment Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>3XX7X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ID: 7**

**Test:** Roll 3 Die – 2 or more 6’s

**Value:** Product of all dice

![Dice Image]
**ID: 7**

**Test:** Roll 3 Die – 2 or more 6’s

**Value:** Product of all dice
**ID: 7**

**Test:** Roll 3 Die – 2 or more 6’s

**Value:** Product of all dice

<table>
<thead>
<tr>
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<th># Stories Committed to Iteration</th>
<th>Roll (Day)</th>
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<th># Stories Completed</th>
<th>Iteration Commitment Met? (Yes/No)</th>
<th>Commitment Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>X X 7 X X 36</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iteration</td>
<td># Stories Committed to Iteration</td>
<td>Roll (Day)</td>
<td>Total of Accepted Value</td>
<td># Stories Completed</td>
<td>Iteration Commitment Met?(Yes/No)</td>
<td>Commitment Points</td>
</tr>
<tr>
<td>-----------</td>
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<td>-------------------------</td>
<td>-------------------</td>
<td>---------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>1</td>
<td>3 X X 7 X X X 36 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ID: 14**

**Test:** Roll 2 Dice – Both Dice are Different

**Value:** Highest of two dice
<table>
<thead>
<tr>
<th>Iteration</th>
<th># Stories Committed to Iteration</th>
<th>Roll (Day)</th>
<th>Total of Accepted Value</th>
<th># Stories Completed</th>
<th>Iteration Commitment Met?(Yes/No)</th>
<th>Commitment Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>3 X X 7 X X 36 X 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ID: 14**

**Test:** Roll 2 Dice – Both Dice are Different

**Value:** Highest of two dice
<table>
<thead>
<tr>
<th>Iteration</th>
<th># Stories Committed to Iteration</th>
<th>Roll (Day)</th>
<th>Total of Accepted Value</th>
<th># Stories Completed</th>
<th>Iteration Commitment Met?(Yes/No)</th>
<th>Commitment Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>3 X X 7 X X 36 X 4 X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ID: 9**

**Test:** Roll 1 Dice – Not a 1

**Value:** Value of Single Die
<table>
<thead>
<tr>
<th>Iteration</th>
<th># Stories Committed to Iteration</th>
<th>Roll (Day)</th>
<th>Total of Accepted Value</th>
<th># Stories Completed</th>
<th>Iteration Commitment Met?(Yes/No)</th>
<th>Commitment Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>XXFXX36X4X6</td>
<td>53</td>
<td>4</td>
<td>Yes</td>
<td>15</td>
</tr>
</tbody>
</table>

**ID: 9**

**Test:** Roll 1 Dice – Not a 1

**Value:** Value of Single Die

[Diagram of dice with numbers 1 through 6]
Iteration 1: Special Actions

- It is ok abandon a story
  - You can come back to it later

- It is ok to redo a story
  - If you complete a story and find that the market does not value as much as you would like, you can redo the story by pulling it back into the WIP. If you later abandon the new redo story, you keep the value of the completed story.
Plan the Second Iteration

Must commit a minimum of 3 stories to each iteration

You can choose to commit more, but you forfeit all commitment points for that iteration if you miss any

<table>
<thead>
<tr>
<th>XL</th>
<th>L</th>
<th>M</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>M</td>
<td>L</td>
<td>XL</td>
</tr>
</tbody>
</table>
Plan the Second Iteration

Must commit a minimum of 2 stories to each iteration

You can choose to commit more, but you forfeit all commitment points for that iteration if you miss any

Remember your release commitment!
<table>
<thead>
<tr>
<th>Iteration</th>
<th># Stories Committed to Iteration</th>
<th>Roll (Day)</th>
<th>Total of Accepted Value</th>
<th># Stories Completed</th>
<th>Iteration Commitment Met?(Yes/No)</th>
<th>Commitment Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3 X X 7 X X 36 X 4 X 6 53</td>
<td>4</td>
<td>4 Yes 15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4 X X X 10 X 3 X X 3 X 16 3</td>
<td>NO</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Iteration 2

• It is ok abandon a story
  – You can come back to it later
• It is ok to redo a story
  – If you complete a story and find that the market does not value as much as you would like, you can redo the story by pulling it back into the WIP. If you later abandon the new redo story, you keep the value of the completed story.
<table>
<thead>
<tr>
<th>Iteration</th>
<th>Stories Committed to Iteration</th>
<th>Roll (Day)</th>
<th>Total of Accepted Value</th>
<th>Stories Completed</th>
<th>Commitment Met? (Yes/No)</th>
<th>Commitment Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3 X X 7 X X 36 X 4 X 6 53</td>
<td>4</td>
<td></td>
<td>4 Yes</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4 X X X 10 X 3 X X 3 X 16</td>
<td>3</td>
<td></td>
<td>3 No</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4 X X 10 X 2 3 X 14 X X 29</td>
<td>4</td>
<td></td>
<td>4 Yes</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>
Iteration 3

• It is ok abandon a story
  – You can come back to it later

• It is ok to redo a story
  – If you complete a story and find that the market does not value as much as you would like, you can redo the story by pulling it back into the WIP. If you later abandon the new redo story, you keep the value of the completed story.

Remember your release commitment!
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>XX7XX36X4X</td>
<td>6 53</td>
<td>4</td>
<td>Yes</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>XXXX10XX3</td>
<td>X 16</td>
<td>3</td>
<td>NO</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>XXX10X23X</td>
<td>X 29</td>
<td>4</td>
<td>Yes</td>
<td>20</td>
</tr>
</tbody>
</table>

98 35
Release Commitment = 60
Commitment Score = 95
Total Score = 193
Story Strategies

• How did you choose which story to pick?
• Did you abandon a story in the middle of an iteration?
• Did you change your strategy at any point?
Retrospective

• What did you learn?
• What elements were like software development?
• What elements are different in software development?
• What impact did committing have on your behavior and decision?
How did committing influence your decisions?
## Estimation and Prioritization

<table>
<thead>
<tr>
<th>Value</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>XL</td>
<td>S</td>
</tr>
<tr>
<td>L</td>
<td>M</td>
</tr>
<tr>
<td>M</td>
<td>L</td>
</tr>
<tr>
<td>S</td>
<td>XL</td>
</tr>
</tbody>
</table>

Priority: Arrow pointing from left to right across the table.
So what do the statistics say?
Expected Value per day
Expected Value per day

![Expected Value per day chart](chart.png)
Running a Monte Carlo Simulation

• Two Strategies:
  – Prioritize lowest cost (meet commitments)
  – Prioritize highest expected value (deliver most value)
How do the strategies compare

<table>
<thead>
<tr>
<th></th>
<th>Easiest-First</th>
<th>Highest Expected Value First</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Delivered Value Points</td>
<td>104</td>
<td>202</td>
</tr>
<tr>
<td>Commitment Points</td>
<td>25</td>
<td>9</td>
</tr>
</tbody>
</table>

On average, always choosing the highest expected value story (and sticking with it) will deliver twice as much value as always going with the easiest stories. On average, this strategy will only cost you 16 commitment points.
Where is an example of incentivizing sub-optimal decisions?

Why should we not just always be working on the highest-priority thing?
What about Risk?

• Split stories
• Get customer feedback early
• High Value may require taking risk
Summary

• Uncertainty is an unavoidable aspect of software development
• Commitments may influence decisions
Group Estimation Exercise

- Number of Jellybeans in the jar
# Jellybean Results

<table>
<thead>
<tr>
<th>Type of Estimate</th>
<th>Typical Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Estimates</td>
<td>0.30 – 1.8 (6X)</td>
</tr>
<tr>
<td>Groups (of ~6)</td>
<td>0.75 – 1.50 (2X)</td>
</tr>
<tr>
<td>Average of the Individuals</td>
<td>0.80 – 1.20</td>
</tr>
</tbody>
</table>
Actual vs. Original Estimate

\[ \frac{P90}{P10} = 4 \]
Jørgensen 2013

• Put software development project for bid on online marketplace vWorker.com
• Received 16 bids.
• Reduced down to 6 bids from vendors that had high (9.5) client satisfaction.
• All 6 bidders went ahead and built the software
Jørgensen 2013

- Highest Estimate 8x the Lowest
- Actual/Estimate Range: 0.7 – 2.9 (4x)
- Actual Performance Range: Worst took 18X the effort of the best
Now What?

How to deal honestly with Uncertainty?
Option 1:

• Continue to do the same thing

“The definition of insanity is doing the same thing over and over again and expecting different results.”

Albert Einstein
Option 2:

• What about giving a distribution range?
Probability Distribution
Estimate/Actual

Actual/Estimated

Frequency

WHAT PEOPLE EXPECT

WHAT PEOPLE HEAR

P10

P50

MEDIAN?

P90

MEAN

TELL ME HOW LONG IT IS GOING TO TAKE

DeMarco, Little (approximated)
Option 3:

- Get Better at Estimating?
Option 4:

- Get Better at Story Splitting?
Option 5:

• Get Better at Managing Uncertainty?
The A/B/C List sets proper expectations

<table>
<thead>
<tr>
<th>A</th>
<th>MUST be completed in order to ship the product and the schedule will be slipped if necessary to make this commitment. The Product Owner will take the heat for the schedule slippage.</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Is WISHED to be completed in order to ship the product, but may be dropped without consequence.</td>
</tr>
<tr>
<td>C</td>
<td>Is NOT TARGETED to be completed prior to shipping, but might make it if time allows.</td>
</tr>
</tbody>
</table>

Only “A” features may be committed to customers.

If more than 50% of the planned effort is allocated to “A” items the project is at risk.
A/B/C List

Typical Delivery

Backlog Plan

Target Delivery Date
A/B/C List

Uncertainty Risk

Backlog Plan

Target Delivery Date

50% 100%
Option 6:

- Get Better at Continuous Delivery (DevOps)?
Option 7:

- Count Stories?
#NoEstimates Example

- Count Stories
#NoEstimates Example

- Count Stories
#NoEstimates Example

- Count Stories
Questions?

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www.kbp.media/agile-leadership