



BITS Pilani presentation

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Module-5 Agile Requirements & Agile Estimation

Key Points taken from the recorderd presentation

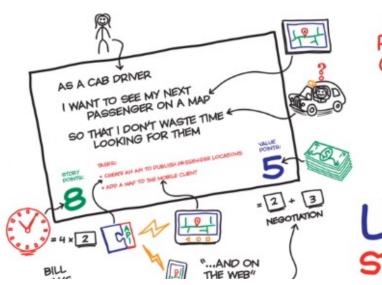


- » Requirements management is challenging 37% of project issues are due to requirements.
- » Agile iterative and incremental development helps manage requirements risk better than waterfall.
- » Requirements are organized into themes, features, epic user stories, user stories, and tasks.
- » Estimation in agile is relative, not quantitative. User stories are relatively sized using the Fibonacci sequence.
- » Estimation is done by consensus, often using techniques like planning poker.
- » Requirements are prioritized by calculating relative priority as value/effort. Higher value, lower effort requirements get higher priority.
- » The prioritized requirements are used to build the product roadmap and product backlog.
- » Requirements are managed at every stage product roadmap, release planning, and sprint planning.
- » Requirements can change continuously in agile until the last sprint/release.

In summary, agile approaches requirements iteratively, relatively sizes and prioritizes them, and uses them to drive development in an incremental way via the roadmap, releases, and sprints.

Agile Requirements-1 (Effective User Stories - CCC)

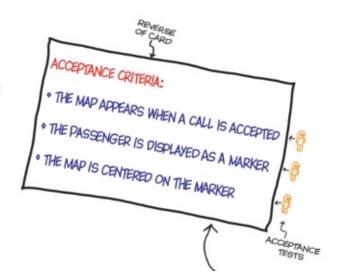






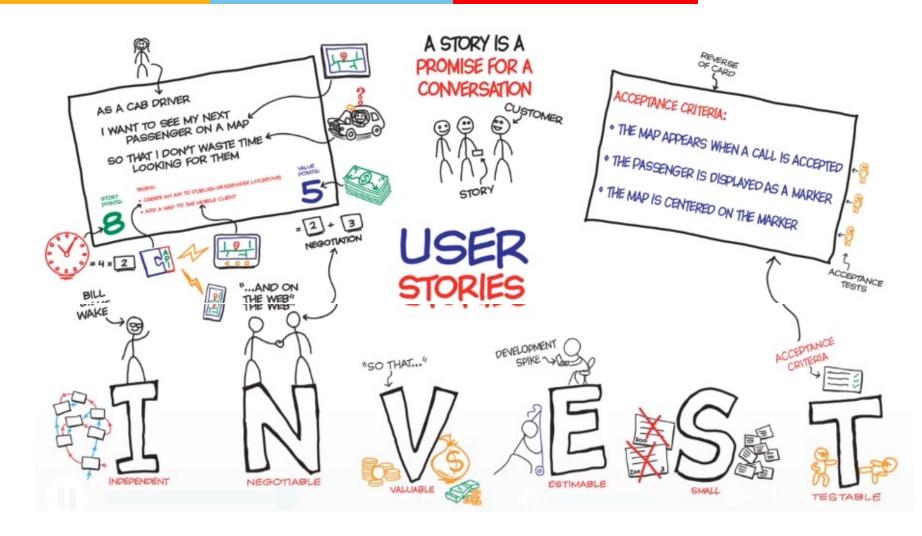






Effective User Stories (CCC & INVEST Guide)



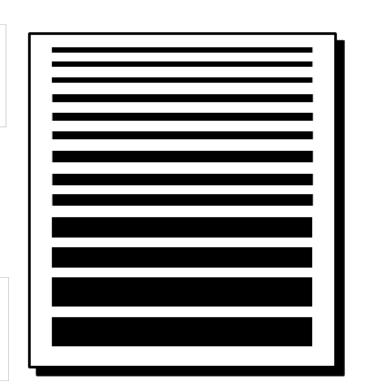


Product Backlog



High Priority





Fine-grained, detailed items ready to be worked on in the next sprint

D E E P
Detailed Emergent Estimatable Prioritized

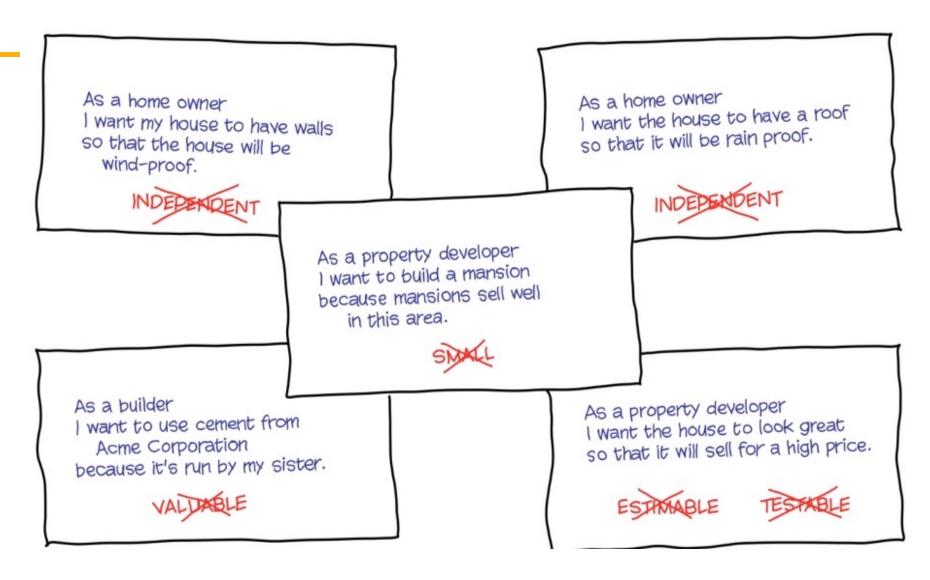
Large, coarse-grained items

Themes, Epic

(Real Estate Project - House Construction)

- 1. As a home owner, I want my house to have walls so that the house will be wind-proof.
- 2. As a home owner I want the house to have a roof so that it will be rain proof.
- 3. As a property developer I want to build a mansion because mansions sell well in this area.
- 4. As a builder I want to use cement from Acme Corporation because it's run by my sister.
- 5. As a property developer I want the house to look great so that it will sell

Q1---?



Approaches to User Stories Prioritization



- Customer Valued Prioritization
 - Kano Analysis (Satisfied, Dissatisfied, Exciters)
 - MoSCoW Technique (Must have, Should have, Could have, Wont have)
- Relative Prioritization
 - Business Value Vs Risk Vs Effort
 - Relative Weighting Prioritization (Value/Cost)
- Story Mapping





Agile Estimation – Story Point Estimation



Agile Estimation

Absolute Estimation

- √ Relative Estimation
- √ Fibonacci Sequence (1,2,3,5,8,13,21,34,55,)
- √ Story Point
- √ Value Point
- √ Velocity
- √ Average Velocity
- √ BFTB (Bank For The Buck)= Value Point /StoryPoint





Velocity = Number of story points the team can deliver in

an iteration/Sprint (OR)

Calculating Velocity:

1.Average = (16+15+17+20) / 4 = 17 Story points

Sprints	Number of Story points Delivered
Sprint-1	16
Sprint-2	15
Sprint-3	17
Sprint-4	20

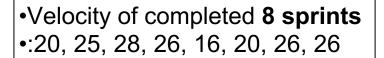
Iterations Completed	Low Multiplier	High Multiplier
1	0.6	1.60
2	0.8	1.25
3	0.85	1.15
4 or more	0.90	1.10

2. Give it as a range

- Velocity is a rolling average. That means that the velocity may increase or decrease depending on what happens with the team.
- · After some iterations the velocity will become stable.







Sorted Velocity List 25 26

90% Confidence

Number of Velocity Observations	nth Velocity Observation	
5	1.	
8	2	
11	3	
13	4	
16	5	
18	6	
21	7	
23	8	
26	9	

- 20 → Lower confidence, certainly we will do
- 23 → Mean Velocity We will get here

26

26

28

26 → Upper confidence, Most we could expec

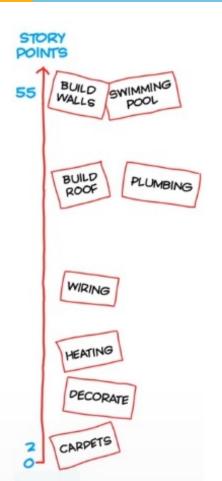
Use the nth Lowest and the nth Highest Observation of a Sorted List of Velocities to Find a 90% Confidence Interval

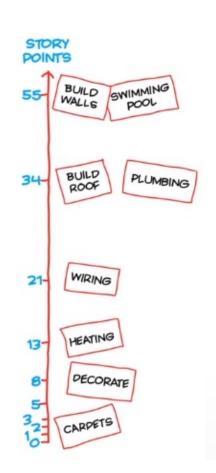
Source: Succeeding with Agile SW development by Mike Cohen

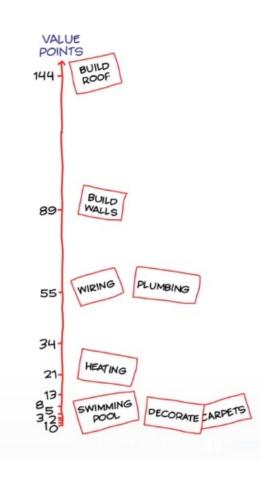
Agile Estimation - User Stories Example-Housing Project











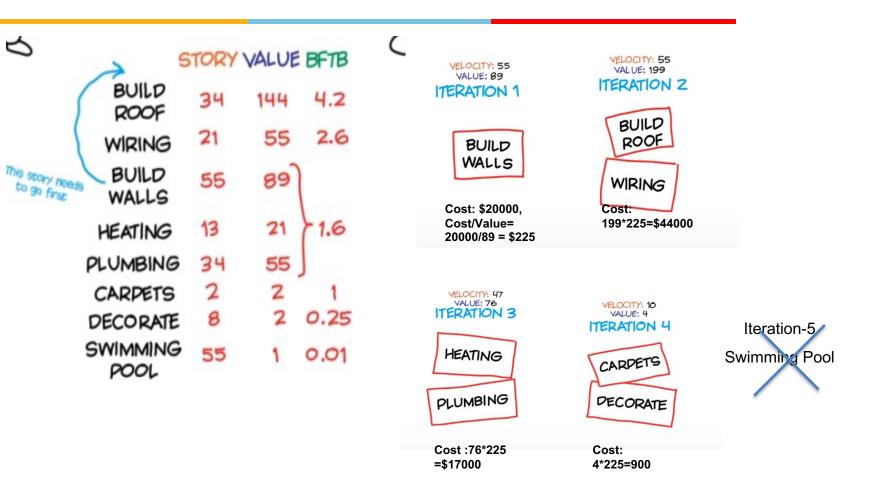
√ Fibonacci Sequence (1,2,3,5,8,13,21,34,55,)

Pool

Heating

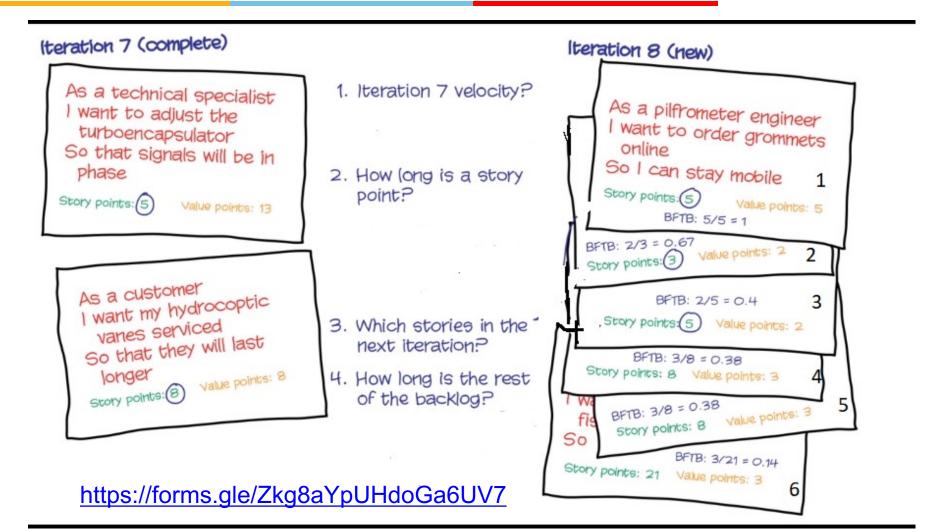
Agile Estimation





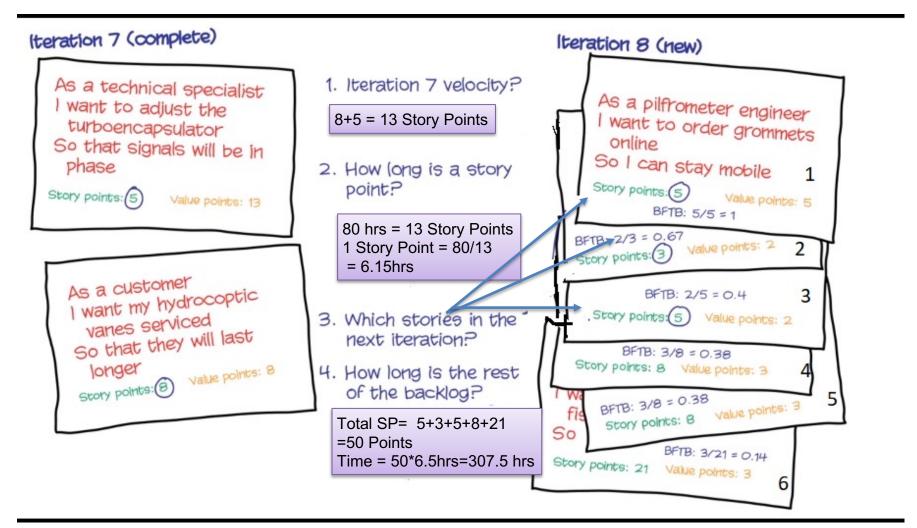
Estimation Exercise (Iteration Length = 2 weeks (10 Days, 8hrs Per day)





Estimation Exercise (Iteration Length = 2 weeks (10 Days, 8hrs Per day)





Planning Poker How User Stories are estimated by the team?



Customer reads story.



Development team asks questions



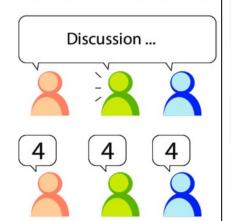
2. Team estimates.

This includes testing.



4. Team estimates again.

Repeat until consensus reached.



Estimator	Round1	Round 2
Team member-1	3	5
Team member-2	8	5
Team member-3	2	5
Team member-4	5	8

Ref: The Agile Samurai by Jonathan Rasmusson Published by Pragmatic Bookshelf, 2010 Image source: https://www.pmi.org/learning/library/agile-project-estimation-techniques-6110



Module – Agile Requirements & Agile Estimation – Additional Notes

Requirements Gathering in Waterfall Method



- In Waterfall model, We tend to describe upfront how the entire product/system will work and document them.
 - PRD or SRS or CRS
- The problem with gathering requirements as documentation isn't one of volume—it's one of communication. It's just really easy to misinterpret what someone wrote.
- Other Issues:
 - Lengthy Process (1 to 3 months), Sometime Project wont get started
 - Requirement change is hard, especially late in the cycle
 - Bad guesses and wrong assumptions and so on

Requirements Gathering in Agile



- In Agile Projects, User Stories are the main way to track the information or requirements, of the project.
- User Stories tell us about:
 - What customer the wants the team to do?
 - How valuable the work is?
 - How long it is likely to take completed?
- User stories are fundamental unit of product development in Agile environments
- User stories describe single feature which enable rapid iteration.



Why Write User Stories?

User stories also enable empathic design is a user-centered design approach
 development as they are written from the perspective of the end user

- A well-written user story will communicate both how a feature will work and how it will benefit the end-user
- User stories ensure that teams are building features to meet a user goal or need instead of "building stuff to build stuff"

Another User Story format and Examples



Writing User Stories

The user story is written in the following format:

"As a [user], I want to do [x] so that I can accomplish [y]."

For example, "As a Gmail user, I want to be able to attach a photo to an email so that I can share it as part of my message."

Who?

What?

Why?

Note: If the user story involves a frontend (user-facing) design component, the design files should be included with the user story

Ref: Writing User Stories By Ryan Harper O'Reilly Media -Video



User Story Examples

A user story for returning images in Google Image search.

"As a Google Images user, when I search for an image I want to see images that match my query so that I can find the image for which I'm looking."

 Note that, user story does not focus on how the images will be returned or displayed, but rather on end user's goal and needs.

Writing Acceptance Criteria for User Stories



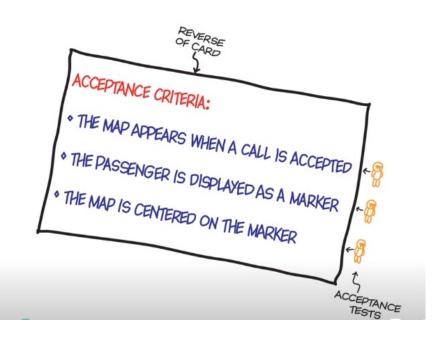
- The second part of the user story, the acceptance criteria, explains how the feature will work.
- The acceptance criteria consists of series of boolean statements (true or false), such as "When [x] happens, [y] should happen

Creating clear acceptance criteria reduces ambiguity for the development team and allows a feature to be easily tested.

Acceptance criteria can also serve as a form of documentation once a feature has gone live, providing a written record of how a feature is intended to work.

Examples Acceptance Criteria

Back of the User Story card



For example for an Gmail user,

"When the user saves an email that has not been sent, it should be stored in the user's Drafts folder"

Outcome: Email stored in Drafts (Yes) or Not (No)

Acceptance Criteria for Google Image search



"As a Google Images user, when I search for an image I want to see images that match my query so that I can find the image for which I'm looking."

Some possible acceptance criteria:

"When the user inputs a query, such as 'cat', the image results should be returned in order of relevance."

"The image results should be returned in rows."

"When the user clicks/taps on an image, a detail view of that image should appear between that image's row and the row below."

- 1. Relevance:
 The image most related to user query appears first, the images least related to user query appears last
- 2. Rows: Layout function
- 3. Tap on Image: how user will interact with the image

Elements of Good User Stories



- Bill Wake came up with the INVEST acronym for good user story.
- Good user stories also have the following characteristics:
- Independent
- Negotiable
- Valuable
- Estimatable
- Small
- Testable

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The 3 Cs- Story Process

In the book Extreme Programming Installed, Ron Jeffries et al. (Addison-Wesley Longman Publishing) describe the story process best:

·Card:

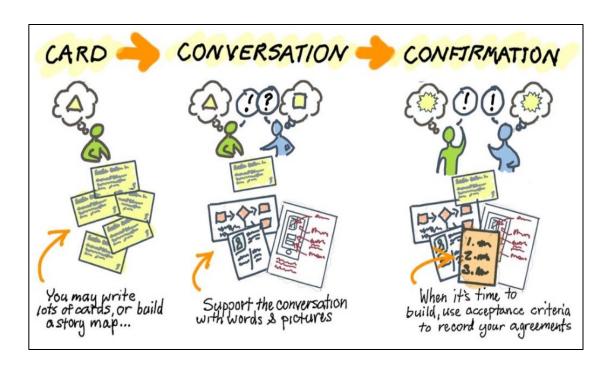
•Write what you'd like to see in the software on a bunch of index cards.

Conversation

•Get together and have a rich conversation about what software to build.

Confirmation

•Together agree on how you'll confirm that the software is done.



Difference Between User Story, Bugs, Constraints



Constraints

Features vs. Bugs

Unlike features, bugs (problems with how a live feature is working) are not written using the user story format.

Instead, bugs are documented with a descriptive title and clear steps for how to reproduce the issue.

For example, if tapping a pause button on a video player in Mobile Safari wasn't working, the bug could be written as follows:

Title: Tapping Pause on Video Player Doesn't Work

- 1.In Mobile Safari on iOS 10.3 / iPhone 6S, go to myvideoplayer.com/videoexample.
- 2. The video will play automatically on mute.
- 3. Tap the pause button. The pause button does not become a play button, and the video is not paused.

Story: Website must be super fast

Story: Design should look really good – Constraint Card

- Stories like these, we call constraints.
- But they are important because they describe characteristics our customers would like to see in their software.
- For example, The Website must be super fast can be written like this.



Ref: Writing User Stories By Ryan Harper O'Reilly Media -Video

How to take care of Frontend Design?

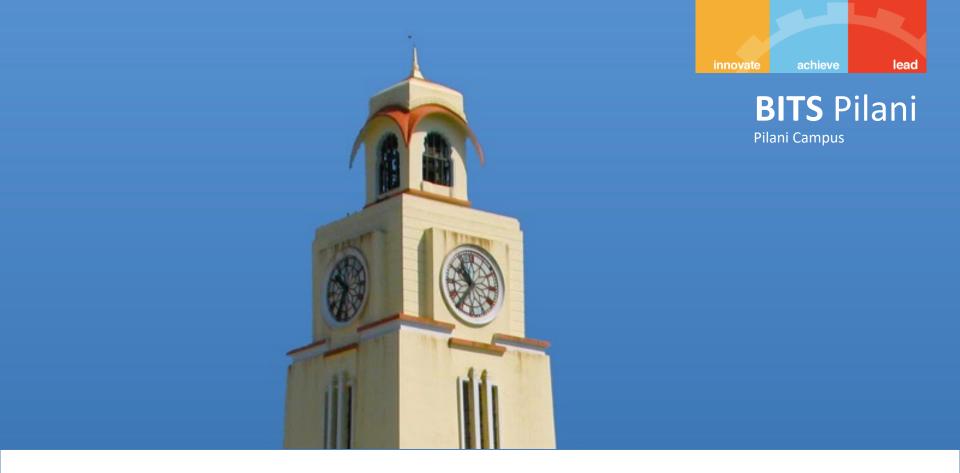


- If a user story includes a new design, the design files illustrating that design (including any interactions) are included with user story.
 - Design tools: Adobe Photoshop, Sketch and Invision
 - Design files: Wireframes, Mockup, Prototypes



Story Grooming Meeting

- Story grooming meetings give the engineering team a chance to review user stories before they are scheduled for a development sprint.
- Story grooming meetings are critical for securing the development team's buy-in.
- The team is given a chance to ask the questions that would normally arise during sprint planning:
 - What should we do if the user enters invalid data here?
 - Are all users allowed to access this part of the system?
 - What happens if…?
- The team provides feedback on the feasibility, viability, and size of each feature and may provide alternate solutions/ or identify previously unforeseen prerequisites or roadblocks for the user needs identified in the user stories.



Agile Estimation







Absolute Estimation

- We estimate our work in hours, days, and weeks.
- We use all the knowledge and experience at hand to make a guess about the amount of time it is going to take.
- Estimation is approximate and not accurate
- Absolute estimation:
 - Estimating in absolute values (Examples, days, weeks, months or KMs, Miles)
 - Absolute values are not easier to judge
 - People are not good at absolute estimation

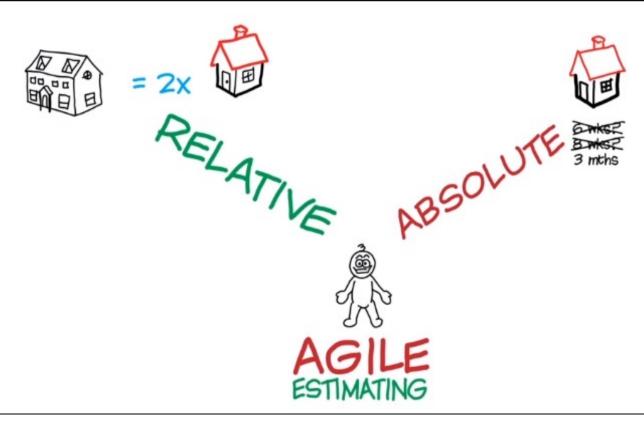
Relative Estimation



- Agile team use relative estimation.
- Relative estimating compares what you don't know against what you do know.
 - For example, You might not be able to guess how much a truck weighs, but if you saw the truck, you can probably guess how many cars equal a truck.
 - A "customer search" story, as it probably involves double the effort to implement than a simple "Login user" story.
- Relative estimation is easier to judge than absolute values.
 - This means judging how big or complex tasks are with respect to other tasks
- This estimation in not designed to be precise.
 - But that doesn't mean it's useless. Instead it gives you a starting point, a way to start the discussion on what it takes to deliver your stories.

Absolute vs Relative Estimation



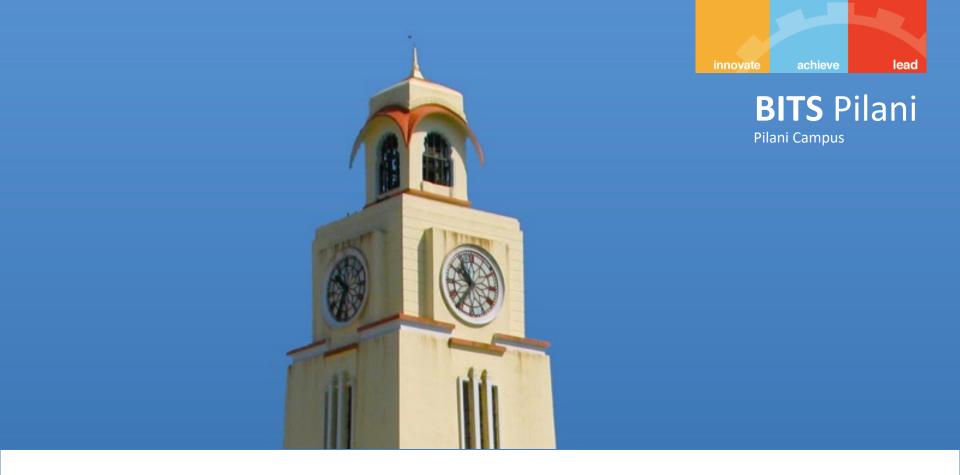


As an analogy, it is much easier to say that Delhi to Bangalore is twice the distance of Mumbai to Bangalore than saying that the distance from Delhi to Bangalore is 2061 kms.

Why Agile team use Relative Estimation?



- 1. Relative estimation takes away from the false comfort of precision.
 - The team is accepting the fact that the estimates will be imprecise.
 - That way we can start talking about what it takes to deliver this story instead spending too much time on estimates.
- 2. Agile uses relative estimating is that it keeps the team from **confusing estimates from commitments**.
 - An estimate is the useful information you might give a co-worker. A commitment is something that you usually give to a supervisor. An estimate is a best guess. A commitment is often a worst case scenario. That's why for Agile planning, you want estimates and not commitments.
- 3. Relative sizing across stories tends to be much more accurate over a larger sample, than trying to estimate each individual story for the effort (in hours) involved.



Story Point Estimation



Story Point for Estimation

- In Agile, we use relative estimation
- We do this by comparing the time to take one story vs time to take another story without using absolute estimates
- We do this by using Story points.
- We will have an exponential number sequence.
 - Something like 1,2,3,5,8, 13 These are the points for each of the stories.
- When we estimate with story points, we assign a point value to each item.
 - The raw values we assign are unimportant. What matters are the relative values. A story that is assigned a 2 should be twice as much as a story that is assigned a 1. A 2 point story is 2/3 of 3 point story.
 - Instead of assigning 1, 2 and 3, that team could instead have assigned 100, 200 and 300. Or 1 million, 2 million and 3 million. It is the ratios that matter, not the actual numbers.

What does a Story Point represent?





- Represents the amount of effort or fixed period of time required to implement a user story. (Size)
- Story Point is not an estimate of the amount of time it takes to implement a Story.
- Some argue that it is a measure of complexity, but that
 is only true if the complexity or risk involved in
 implementing a user story translates into the effort
 involved in implementing it.

Fibonacci series as Story points



- The most common way is to estimate a user story is to use the **Fibonacci series** (1, 2, 3, 5, 8, 13, 21, 34, 55..... with each number the sum of the preceding numbers.
- Why Fibonacci?
 - It's because numbers that are too close to one another are impossible to distinguish as estimates.
- In Fibonacci series, after the 2 (which is 100% bigger than one), each number is about 60% larger than the preceding value.

Predictability of User Stories Estimation



- Small stories tend to result in a more accurate and reliable estimates.
- Small stories reduces variability and improves predictability.
- So, a 13 or 20-point story is likely much less predictable than several 2, 3, or 5-point stories.
- Relative story point estimates using the Fibonacci sequence are, by design, increasingly less accurate for larger estimates – like the "cone of uncertainty"





1 –QUICK TO DELIVER AND MINIMAL COMPLEXITY. AN HOUR

Example: add field to a form

2 –QUICK TO DELIVER AND SOME COMPLEXITY. MULTIPLE HOURS

Example: Add parameter to form, validation, storage

3 –MODERATE TIME TO DELIVER, MODERATE COMPLEXITY, POSSIBLE UNKNOWNS

Example: Migrate somewhat complex static CSS into a CSS pre-processor

5 -LONGER TIME TO DELIVER, HIGH COMPLEXITY, LIKELY UNKNOWNS

Example: Integrate with third-party API for pushing/pulling data, and link to user profiles in platform

8 -LONG TIME TO DELIVER, HIGH COMPLEXITY, CRITICAL UNKNOWNS

Example: Overhaul the layout/HTML/CSS/JS of a web application

13 -LONG TIME TO DELIVERY, HIGH COMPLEXITY, MANY CRITICAL UNKNOWNS

Example: Migrate application from an outdated data store to new DB technology and ORM

Ref: GenMan solution Inc.

How User Stories are estimated by the team?

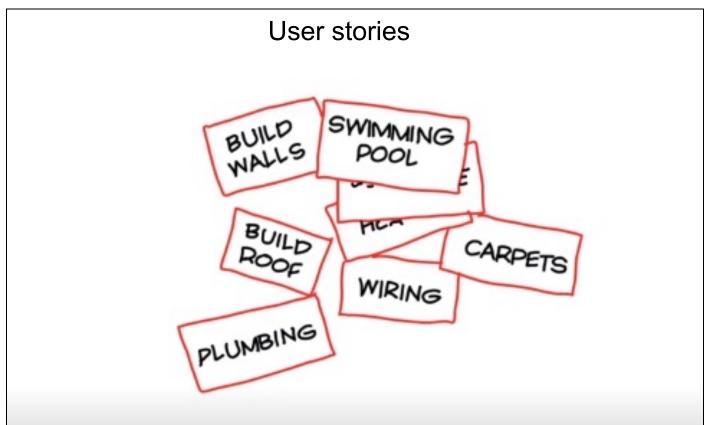


- One method is to play Planning poker game.
 - Planning poker helps give everyone a voice.
 - Combining of individual estimates through group discussion leads to better estimates
 - Combat Groupthink-meaning, the way that people tend to agree with the most popular idea.
- Planning poker is a game where the development team estimates stories individually first (using a deck of cards with numbers like 1, 2, 3, 5, 13 ...on them) and then compares the results collectively together after.
- If everyone's estimate is more or less the same, the estimate is kept. If there are differences, however, the team discusses them and estimates again until consensus is reached.

Story Point Estimation-An Example

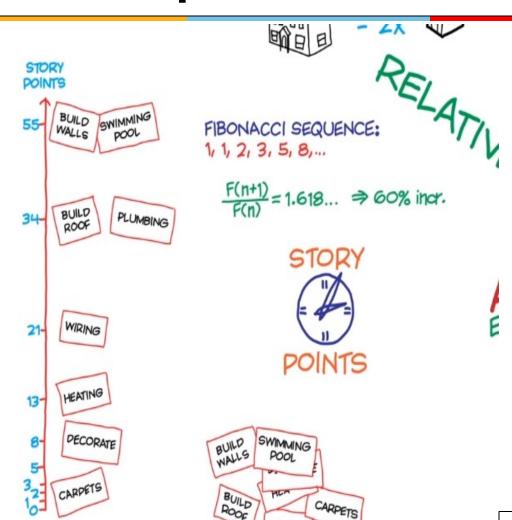


Project: Build a House, Suppose we have the following bunch of user stories to be estimated. How do we start?



Story Point Estimation – Example





WIRING

LIMBING

Steps:

- 1.The team may start with the smallest Carpets Story, assign 2 points.
- 2.Next, for example, we may discuss the Build wall story. We agree on, it is 30 times larger than Carpet story. Hence, we assign 55 points in Fibonacci scale.
- 3. Then relatively, assign story points to other stories,

Decorate, Heating etc....

At this point, We do not know the effort of each story

Ref: The Agile Sketchpad, O'Reilly Media Dawn Griffiths , David Griffiths

Value Point

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- A user Story has two estimates.
 - Story point estimate of time
 - Value Point estimate of value
- Developers, the people who do the work, estimate User Stories in Story points,
- Customer / Product owner estimates User Stories in Value Point, in the same way.

Story Card

Story Point : Amount of time/effort Value Point : Worth to Customer

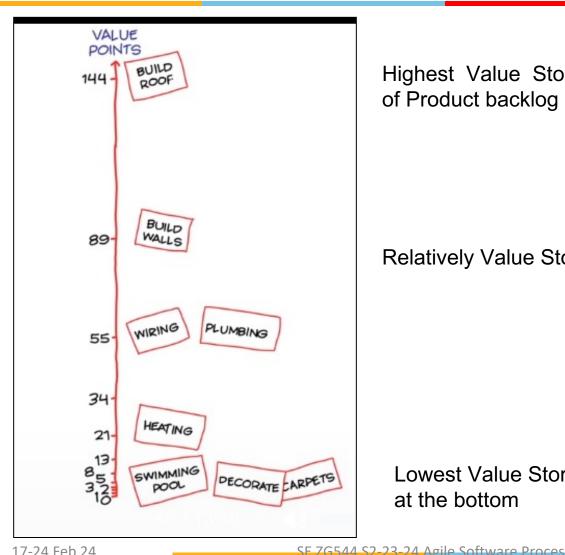
Agile is about delivering value early.



Ref: The Agile Sketchpad,O'Reilly Media Dawn Griffiths ,David Griffiths

Value Point Estimation – use the previous example





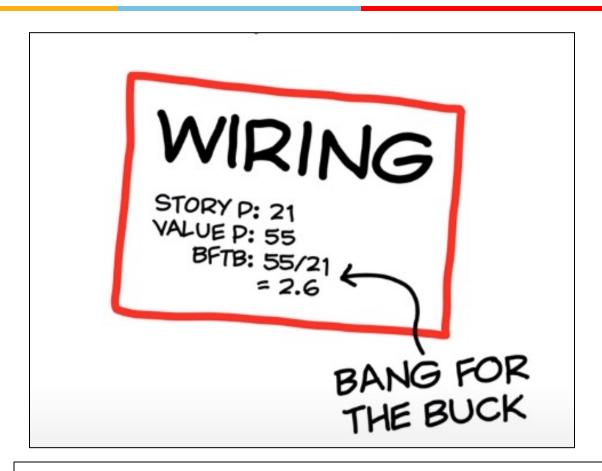
Highest Value Stories at the top of Product backlog

Relatively Value Stories

Lowest Value Stories at the bottom

Bang For the Buck (BFTB) (OR) Priority



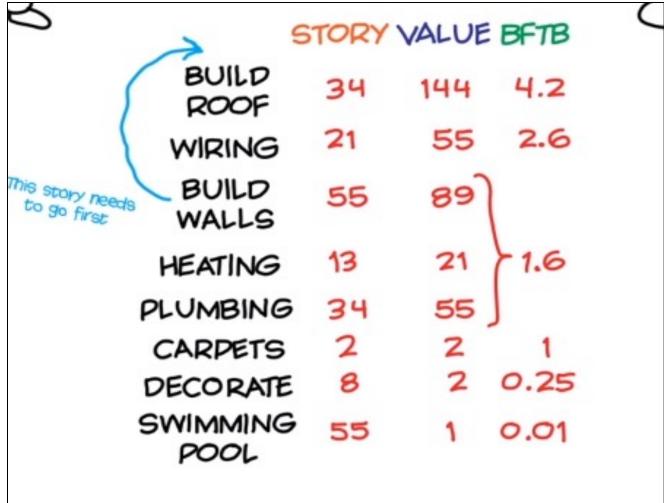


BFTB = Value Point divided by Story Point for each story

How stories are prioritized for each Iteration – by BFTB



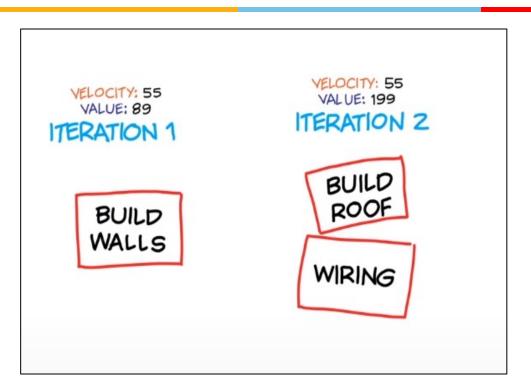
Product Backlog

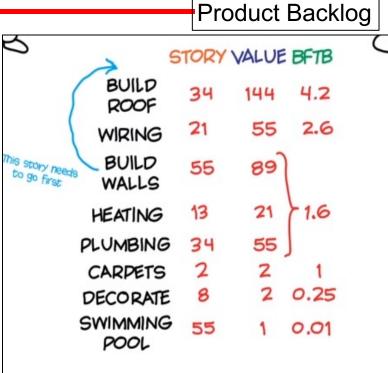


Ref: The Agile Sketchpad, O'Reilly Media Dawn Griffiths ,David Griffiths

Highest value delivered in early Iterations







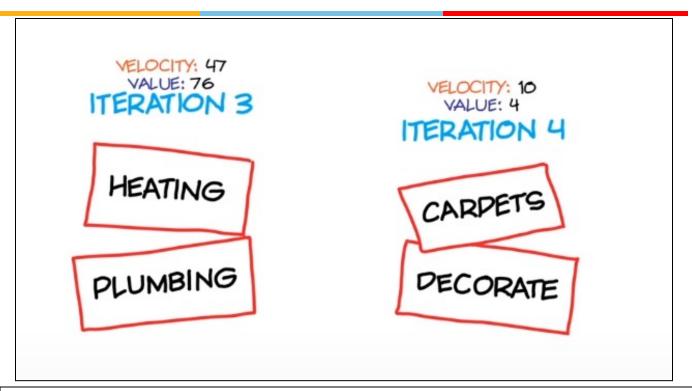
Suppose, Cost of this iteration-1 is 20000\$;

= 20000/89 ~ 225\$ Per Value Point.

For Iteration-2 = 225*199 ~ \$44,000 (Highest value delivered)

Value delivered decreases as iteration progress



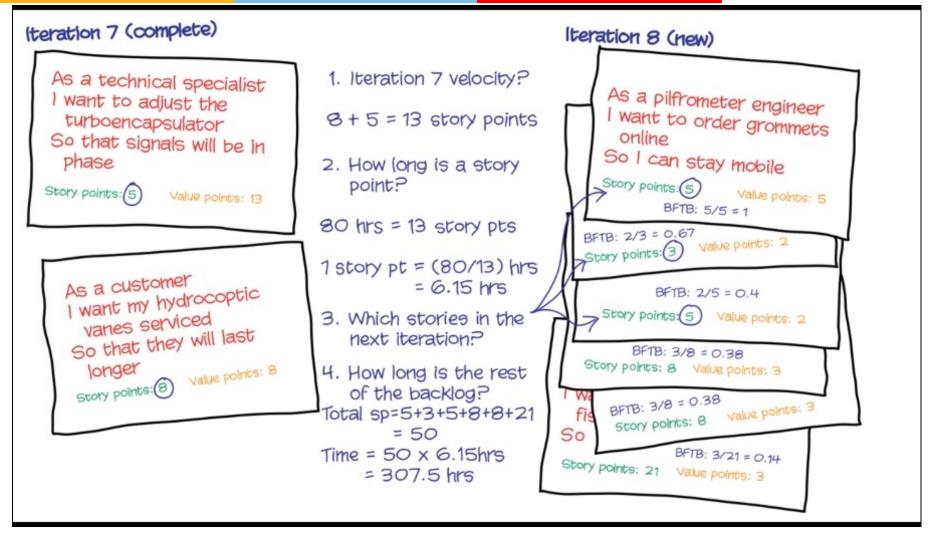


Iteration-3 value = 76*\$225 = \$17,100; Iteration-3 = 4*225=900

- •This is an example, but In reality, the value will decrease after many iterations, then customer can take a call to continue the project or not.
- •Over the period of time, after some iterations the velocity will become stable and value delivered will decrease.

Estimation Exercise (Assume, 2 week Iteration)





Story Points – Real Examples



Pointing User Stories

Pointing Rubric at iHeartMedia (two week development sprints)

1: Text Change

2: Text Change + Small Functionality Change

3: One Day of Work for One Developer

5: One Week of Work for One Developer

8: Two Weeks of Work for One Developer

13: Two Weeks of Work for Two Developers

Pointing Rubric at Condé Nast Entertainment (one week development sprints)

1: Text Change

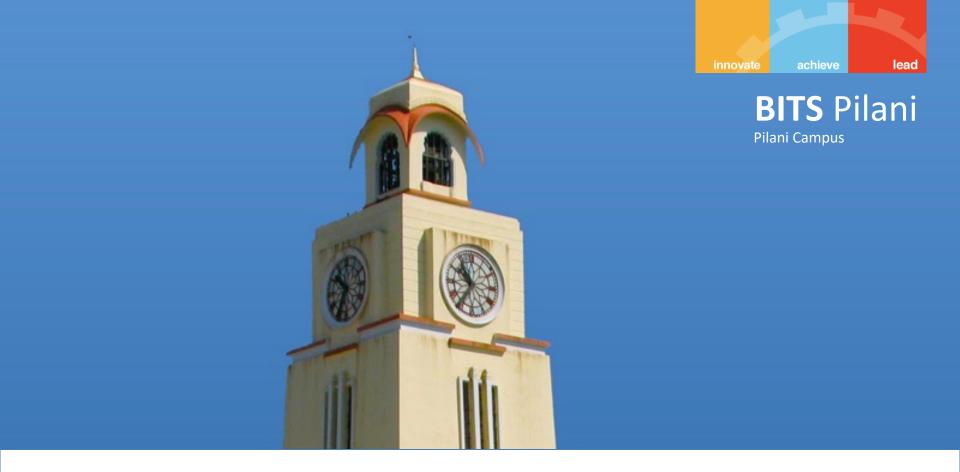
2: Text Change + Small Functionality Change

3: One Day of Work for One Developer

5: One Week of Work for One Developer

8: One Week of Work for Two Developers

13: Must Be Broken Down Into Smaller Stories



Other Estimation Techniques



Estimate by Analogy

- Comparing a user story to others
 - "This story is like that story, so its estimate is what that story's estimate was."
- Don't use a single gold standard
 - Triangulate instead
 - Compare the story being estimated to multiple other stories





- Confirm estimates by comparing the story to multiple other stories.
- Group like-sized stories on table or whiteboard

3 points	Story A		
2 points	Story B	Story E	Story F
1point	Story C	Story D	

Ideal Time



- How long something would take:
 - · If it's all one person worked on
 - Had no interruptions
 - And everything you need is available.
- The ideal time of a football game is 90 minutes
 - Four 15-minute quarters
 - The elapsed time is much longer (3+ hours)
- It's easier to estimate in ideal time.
- It's too hard to estimate directly in elapsed time.
 - Need to consider all the factors that affect elapsed time at the same time you're estimating



Story Points Vs Ideal Time

- Story points help drive cross-functional behavior
- Story point estimates do not decay
- Story points are a pure measure of size
- Estimating in story points is typically faster
- My ideal days cannot be added to your ideal days
- Ideal days are easier to explain outside the team
- Ideal days are easier to estimate at first





- Level of Effort (LOE) or T-Shirt Sizing
 - T-shirt size," "level of effort" (LOE), or "small, medium, large." (Easy, but lack precision, inability to add up several stories into a meaningful measure.)

Extra small	Small	Medium	Large	Extra Large	Extra Extra Large
1 point	2 points	3 points	5 points	8 points	13 points

Disaggregation

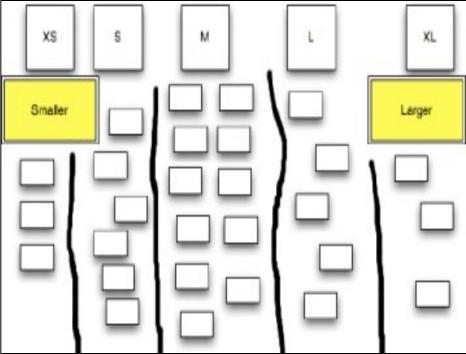
 Breaking a big story into smaller stories ,we know how long the smaller stories take, So, disaggregating to something we know lets us estimate something bigger we don't know



Affinity Grouping

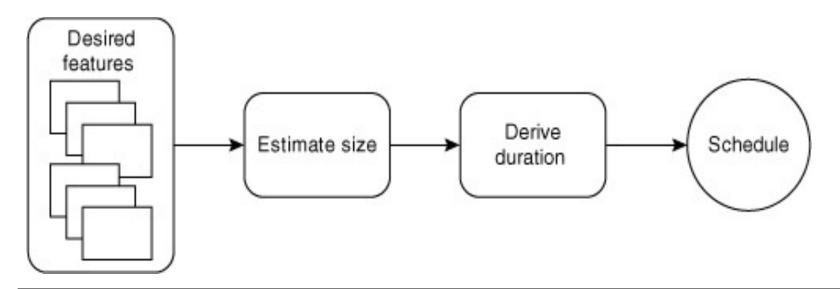
 Team members simply group items together that are like-sized, resulting in configuration similar to the one in figure.





Estimating the duration of a project begins with estimating its size.





- Sum the story-point estimates for all desired features we come up with a total size estimate for the project.
- If we know the team's velocity we can divide size by velocity to arrive at an estimated number of iterations.
- We can turn this duration into a schedule by mapping it onto a calendar.

Source: Agile Estimating and Planning by Mike Cohn Published by Addison-Wesley Professional, 2005





- Remembering that story points and ideal days are estimates of the size of a feature helps you know when to re-estimate.
- You should re-estimate only when your opinion of the relative size of one or more stories has changed.
- Do not re-estimate solely because progress is not coming as rapidly as you'd expected.
- Let velocity, the great equalizer, take care of most estimation inaccuracies.

Source: Agile Estimating and Planning by Mike Cohn Published by Addison-Wesley Professional, 2005



Thank you