User Stories

Big Design Up Front

- Traditional requirements analysis:
  - Talk to stakeholders (customer, end users, etc.)
  - Think about the planned system; develop UML models
  - Maybe prototype a bit
  - Spend months developing a big document covering every requirement of the system up front
  - Give said document to developers
  - Receive word from developers that the project will actually take 24 months instead of the desired 6 months

Big Design Up Front: Problems

- Very difficult to envision every possible feature needed up front
- Process of documenting every requirement is tedious and error-prone
- Customers often change their minds or come up with new ideas as they see the software being developed
- Requirements documents are long and boring
  - Greater chance they will simply be skimmed or entire sections will be skipped
  - Hard to grasp the big picture behind a 300-page requirements specification

Big Design Up Front: Problems

- Time wasted writing 3/4 of the requirements that the team won't be able to complete in the allotted 6 months
- More time wasted as the development team decides which requirements it can implement in time
- Levels of indirection between customers and developers
  - Lack of direct communication leads to misinterpretation of the intended functionality
  - Remember the telephone game?

Big Design Up Front: Problems

- Focusing on a checklist of requirements rather than on the user's goals does not necessarily lead to a good overall understanding of a product:

3.4) The product shall have a gasoline-powered engine
3.5) The product shall have a four wheels
    3.5.1) The product shall have a rubber tire mounted to each wheel
3.6) The product shall have a spinning blade mounted on its underside
3.7) The product shall have a foam seat

vs.

- The product makes it fast and easy for me to mow my lawn
- I am comfortable while using the product

Big Design Up Front: Problems

- Software is intangible
  - Very hard to estimate reliably
  - Pipe dream: glorious PERT charts enumerating every task that must be completed, the duration of each task, and the order in which the tasks must be completed

Big Design Up Front: Problems

- As software is built, customers often change their minds about existing features and think up new features
- Requirements changes are called a change of scope
  - Implies that the scope of the project was previously fully defined
  - Implies that a project is complete when it fulfills its list of requirements rather than its intended users' goals

Software Requirements = Communication

- Those who want the software must communicate with those who will build it
- A project relies on information from those who view the software from a business perspective, and those who view it from a development perspective
  - If the business side dominates too heavily, it can mandate functionality and deadlines typically with little concern that:
    - The development team can deliver the requested functionality on schedule
    - The development team understands exactly what is being requested

Software Requirements = Communication

- On the other hand, if the development side dominates, it
  - Replaces the language of business (the language of the domain) with technical jargon
  - Loses the opportunity to learn what is needed by listening
- Is this any better? Likely not …

A Solution?

- Given that:
  - Requirements often change throughout a project
  - Reliable estimation is extremely difficult
  - It is difficult to come up with all requirements up front
- What do we do?
  - Make decisions based on the information we have
  - Do it often
- Spread decision-making across the duration of the project: we need a process that gets us information as early and often as possible

User Stories

- A user story describes functionality valuable to a user/customer
- Three main components:
  - **Card**: A written description of the story used to plan and serve as a reminder
  - **Conversation**: Conversations about the story to flesh out its details
  - **Confirmation**: Tests that convey and document details; confirm to us when the story is complete
- Often written on the front of an index card, with confirmation details written on the back

User Stories: Customer Team

- Stories are usually written by a customer team:
  - Ensure the software will meet the needs of its users
  - Includes developers, testers, product managers, actual users, customers, etc.
- Stories must be written in the language of the user – not in technical jargon
  - Allows the customer team to be able to prioritize stories

User Stories: Examples

- Good examples:

> A user can post his/her resume to the web site
> A user can search for jobs
> A company can post new job listings

- Bad examples:

> The software will be written in C++
> The program will connect to the database through a connection pool

- User's don't care about the programming language used or technical details such as how the application connects to a database

User Stories: Common Templates

- “As a *<role>*, I want *<goal/desire>*.”
- “In order to *<receive benefit>* as a *<role>*, I want *<goal/desire>*.”
- “As *<who>* *<when>* *<where>*, I *<what>* because *<why>*.”
- “As a *<role>*, I can *<action with system>* so that *<external benefit>*.”
- “As *<persona>*, I want *<what?>* so that *<why?>*.”

User Stories: Conversation

- Notice that many details are missing
  - What fields can the user search for jobs on?
  - Does the user have to be logged in?
- A user story is a reminder to have a conversation
  - We will discuss these details with the customer at the time they become important (just-in-time requirements analysis)
  - The conversation is the important part – not the story itself
- Cards represent customer requirements rather than document them
  - Card contains the story; details worked out in the conversation and recorded in the confirmation

User Stories: People Really Use Them

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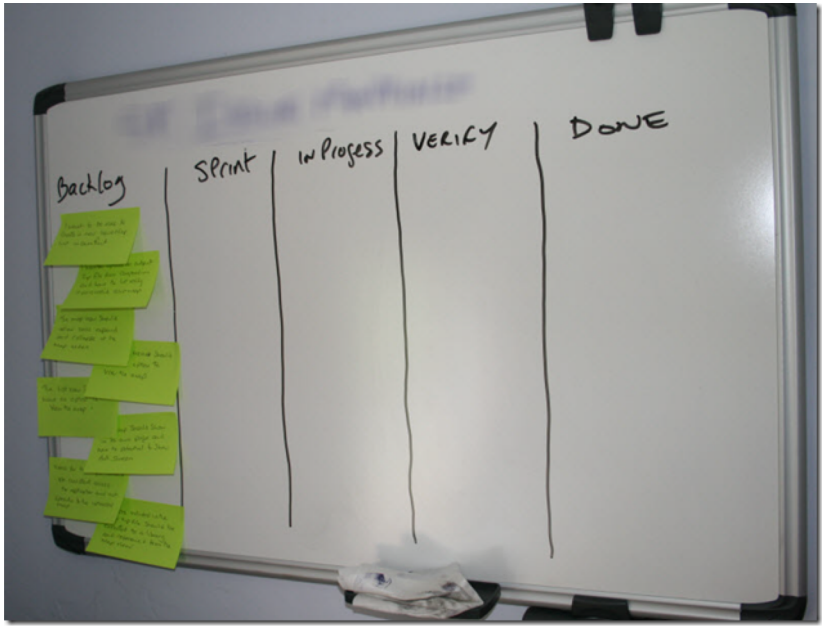
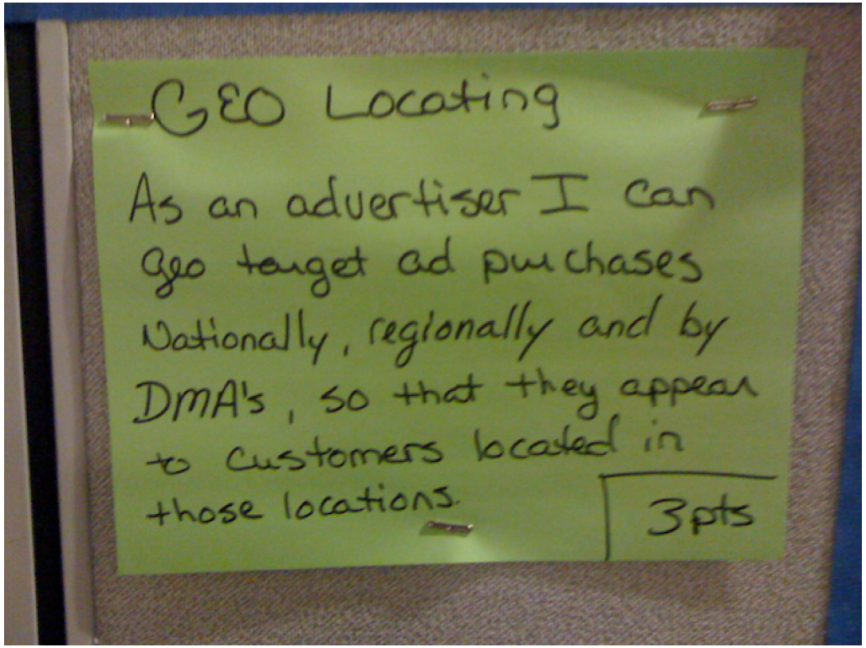


User Stories: People Really Use Them



User Stories

- Front of the card:
  - User story
  - Estimate in story points (more on this later)

> A recruiter can post a new job (3 points)

- Back of the card:
  - Captures the expectations of the user in the form of acceptance tests
  - These tests will help confirm that a story is complete

> Try it with an empty job description (fail)
> Try it with a really long job description (fail)
> Try it with a six-digit salary (pass)

User Stories: Estimation

- The cost of a story is the estimate given to it by the developers
- Each story is assigned an estimate in story points
  - This indicates the size and complexity of the story relative to other stories
  - For example, a story estimated at four points is expected to take twice as long as a story estimated at two points

User Stories: Estimation

- Each team defines the meaning of story points:
  - One team might treat a point as an ideal day of work
  - Another team might define a story point as an ideal week of work
  - Yet another team might treat a story point as a measure of the complexity of a story
- **Recommendation for the project**: treat one story point as an ideal evening of work for one developer (ideal = no interruptions, good focus/concentration)

User Stories: Acceptance Tests

- The back of each card contains acceptance tests
  - They capture important aspects about stories
  - They verify that a story was developed to work exactly the way the customer team expected it to work
  - They run frequently – ideally automated
  - They are intentionally left short and incomplete
  - The team can add/remove tests at any time
- Goal is to convey additional information so developers will know when the story is done

User Stories: Acceptance Tests

- Story: *A user can pay for the items in a shopping cart with a credit card*

  Test with Visa, MasterCard and American Express (pass).
  Test with Diner's Club (fail).
  Test with a Visa debit card (pass).
  Test with good, bad, and missing security codes.
  Test with expired cards (fail).
  Test with different purchase amounts (try going over card limit)

- By providing tests to the developer early, the customer team has:
  - Stated their expectations
  - Reminded the developers of a situation they might have forgotten

Story-Driven Development

- The customer team and developers choose length of each iteration of development of the project
  - Might be anywhere from 1 to 4 weeks
  - Same iteration length used for entire project
  - At the end of each iteration, developers are responsible for delivering fully usable code for some subset of the application
  - The functionality captured by the stories in the iteration just completed should now be fully usable in the application

Story-Driven Development: Release Planning

- Developers estimate how much work (in story points) they'll be able to complete each iteration to set the project's velocity
  - First estimate will be wrong, but this is useful to roughly determine the iteration schedule
- To plan releases, we sort stories in piles representing iterations, where the stories in each pile add up to no more than the estimated velocity
  - Highest-priority stories go in the first pile (iteration 1)
  - Next highest-priority stories go in the second pile (iteration 2)
  - ...

Story-Driven Development: Release Planning

- Before each iteration starts, the customer team can make mid-course corrections to the plan
- As we complete iterations, we can determine the development team's actual velocity
  - We can work with this instead of the estimated velocity
  - This means that each pile of stories may need to be adjusted by adding or removing stories

Story-Driven Development: Release Planning

Stories

Story	Story Points
Story A	3
Story B	5
Story C	5
Story D	3
Story E	1
Story F	8
Story G	5
Story H	5
Story I	5
Story J	2

Release Plan

Estimated velocity of 13

Iteration	Stories	Story Points
1	A, B, C	13
2	D, E, F	12
3	G, H, J	12
4	I	5

Story-Driven Development: Prioritization

- To plan releases, customer team must prioritize stories:
  - Desirability of a feature to a broad base of users/customers
  - Desirability of a feature to a small number of important users/customers
  - Cohesiveness of a story in relation to others
    - For example, a zoom out story might not be high priority on its own, but might treated as such because it is complementary to zoom in, which is high priority

Story-Driven Development: Prioritization

- Developers have different priorities for many stories:
  - They may suggest a story's priority be changed based on technical risk or because it is complementary to another
- Customer team listens to their opinions, but ultimately sets priorities in a manner that maximizes value delivered to the organization

BDUF vs. Story-Driven Development

- Traditional waterfall model:
  - Write requirements, analyze them, design a solution, code said solution, test solution
  - Customers involved at beginning to write requirements
  - Customers involved at the end for acceptance testing
  - Between requirements and acceptance: customers often disappear
- Story-Driven Project:
  - Customers and users involved throughout duration of the project
  - Not allowed to disappear in the middle of the project

Writing Good Stories

- Good stories should follow the INVEST acronym:

Independent

Negotiable

Valuable

Estimatable

Small

Testable

Writing Good Stories: Independent

- Dependencies between stories should be avoided
  - Dependencies lead to prioritization and planning problems
  - Make estimation more difficult
  - Need to have the flexibility to easily move stories around in the release schedule, if needed
- Solutions:
  - Combine dependent stories into a larger, independent story
  - Find a different way of splitting the stories

Writing Good Stories: Independent

- Dependent stories:

> The customer should be able to pay with Visa.
> The customer should be able to pay with MasterCard.
> The customer should be able to pay with American Express.

  - The first credit card will take 3 days to support, but each other card after that will only take 1 day. Which story should receive the 3 day estimate?

- A better split:

> The customer cap pay with one type of credit card.
> The customer can pay with two additional types of credit cards.

Writing Good Stories: Negotiable

- Stories should be negotiable – they are not written contracts or requirements
- Stories are reminders to have a conversation
  - Do not need to include all relevant details
  - We negotiate the details in a conversation between the customer team and the development team
  - If we do know some details when the story is written, we can annotate the card with those details

Writing Good Stories: Negotiable

- Right amount of information to the developer and customer who will discuss the story:

> A company can pay for a job posting with a credit card.
>
> Note: Accept Visa, MasterCard, AmEx. Consider Discover.

- Too many missing details for developers to view the story as definitive

Writing Good Stories: Negotiable

- Too much detail:

> A company can pay for a job posting with a credit card.
>
> Note: Accept Visa, MasterCard, and AmEx. Consider Discover. On purchases over $100, ask for cardID number from back of card. The system can tell what type of card it is from the first two digits of the card number. The system can store a card number for future use. Collect the expiration month and date of the card.

- Can lead to mistaken belief that the story card reflects all the details and that there's no further need to discuss the story with the customer

Writing Good Stories: Valuable

- User stories should be valuable to the users and customers
- Avoid stories valued only by developers
  - Should be written so that the benefits to the customers / users are apparent
  - This allows customers to intelligently prioritize the stories

Writing Good Stories: Valuable

- Poor examples:

> All connections to the database are through a connection pool.
> All error handling and logging is done through a set of common classes.

- Better:

> Up to fifty users should be able to use the application with a 5-user database license.
> All errors are presented to the user and logged in a consistent manner.

Writing Good Stories: Estimatable

- Developers need to be able to estimate the size of a story

- Three reasons why a story might not be estimatable:
  1. Developers lack domain knowledge
  2. Developers lack technical knowledge
  3. The story is too big

Writing Good Stories: Estimatable

1. Developers lack domain knowledge
   - If developers do not understand a story, they should discuss it with the customer who wrote the story
   - Not necessary to understand all details but developers should have a general understanding of the story

Writing Good Stories: Estimatable

2. Developers lack technical knowledge
   - Send one or more developers on a spike: a brief experiment to learn about an area of the application
   - Developers learn just enough that they can estimate the task
   - The spike itself is given a defined maximum amount of time (a timebox), allowing the developers to estimate the spike
   - Unestimatable stories turn into 2 stories: the spike and then the actual story

Writing Good Stories: Estimatable

3. The story is too big
   - Example: *A Job Seeker can find a job*
   - Developers will need to disaggregate it into smaller, constituent stories
- Stories that are too large are called epics
- Despite being too large to estimate, epics are useful as placeholders – reminders about big parts of the system that must be discussed
  - This allows us to make a conscious decision to temporarily gloss over large parts of a system
  - Can be assigned a large, pulled-from-thin-air estimate

Writing Good Stories: Small

- Size matters – stories should be small, but not too small
- Stories that are too large or small make planning difficult

Writing Good Stories: Testable

- Stories must be written so as to be testable
- Successfully passing its tests proves a story has been successfully developed
- If the story cannot be tested, how will the developers know when they have finished implementing it?
- Untestable stories commonly appear with nonfunctional requirements:

> A user must find the software easy to use.
> A user must never have to wait long for any screen to appear.

Writing Good Stories: Testable

- Tests should be automated as much as possible. Strive for 99% automation – not 10%
- Things change quickly:
  - Code that worked yesterday may be broken today
  - Automated tests detect this quickly
- Some stories cannot be tested automatically, however:

> A novice user is able to complete common workflows without training.

- This can be tested, but not readily automated

User Stories: Summary

- Emphasize verbal rather than written communication
  - Remind us to have a conversation
- Comprehensible by both customers and developers
  - Written in the language of the domain
- The right size for planning
  - Not too large, not too small
- Work for iterative development
  - As long as we follow INVEST, can easily move stories between iterations
- Encourage deferring detail
  - We may not even need a story – don't waste time detailing it up front

User Stories: Some Caveats

- Scaling up
  - How does this scale to very large projects with geographically distributed teams, especially if we are using small physical cards for our stories?
- Vague, informal, incomplete
  - As user stories are intended to start conversations, they are informal, open to interpretation, and short on details; they are definitely not appropriate for a formal agreement or contract
- Lack of non-functional requirements
  - Since performance or non-functional requirements are most often not included in user stories (testability), there is a risk of them being overlooked