CS 312 Software Development

Agile Development

Manifesto for agile software development (2001)

We are uncovering better ways of developing software by doing it and helping others do it.

Through this work we have come to value:

- **Individuals** and **interactions** over processes and tools
- **Working software** over comprehensive documentation
- **Customer collaboration** over contract negotiation
- **Responding to change** over following a plan

That is, while there is value in the items on the right, we value the items on the left more.

http://agilemanifesto.org

Agile vs. agility

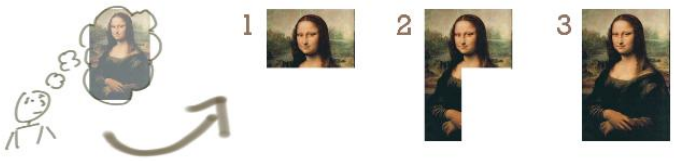
1. Find out where you are,
2. Take a small step towards your goal,
3. Adjust your understanding based on what you learned, and
4. Repeat

•When faced with two or more alternatives that deliver roughly the same value, choose the path that makes future change easier

Dave Thomas, Agile is Dead

Do you want to increment or iterate?

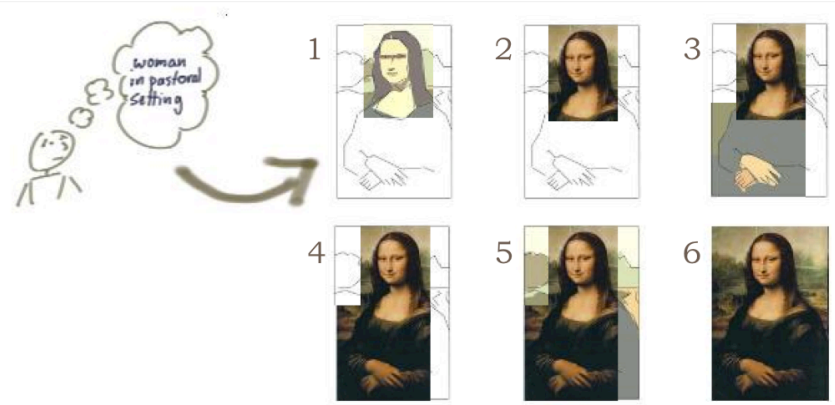
Incremental



Iterative

https://jpattonassociates.com/dont_know_what_i_want/

Iterative Incremental



http://itsadeliverything.com/revisiting-the-iterative-incremental-mona-lisa

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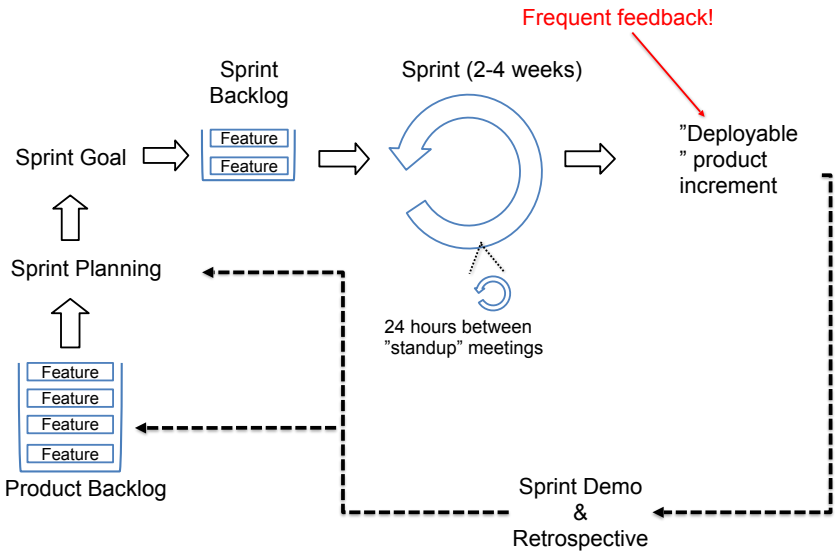
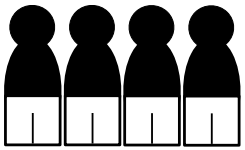
Scrum

Scrum (in a nutshell)



Scrum team



Development Team

- Self-organizing ← Critical!!
- Cross-functional
- No hierarchy of specific titles
- A single team without sub-teams
- Accountable as a group

Product Owner

- Represents the customer
- Responsible for prioritizing the product backlog

Scrum Master

- Facilitator for team
- Facilitates SCRUM process

Scrum artifacts: Product backlog

Product Backlog

Sprint Backlog

- A *prioritized* list of user stories (and other tasks) maintained by the product owner
- Evolves as you learn more (stories are added, removed, re-prioritized)
- A subset of stories are chosen for each sprint (Spring Backlog)
- Should be readily accessible to everyone on the team (and me!)

Relevant tools: GitHub issues, Google Doc, Trello, Pivotal Tracker, …

Effort estimation and velocity

- Not all stories count equally, need to know how much work we are taking on
- Assign each story (and bug) points
  - Recommend: 1, 2, 4, 8 (8 is rare and should be split)
  - Vote independently, high/low explain their vote
  - Iterate until convergence OR take high vote
- Aim for constant velocity
  - velocity := points per week

Student Advice: Scrum/Stand-ups

- "5-minute daily standups really helped us stay on track, and share knowledge when stuck"
- "Biggest challenge for us was team communication/ coordination"
- "Have a scrum leader each time, rotate the position"
- "1 meeting per week isn't enough"

Adapted from Berkeley CS169

Adapting Scrum for CS312

- Scheduling a daily scrum with entire team will be impractical
  - We will use class time instead
  - Thus only 2 "daily" scrums are required
- *Only 2 meetings per week won't be enough*
  - *Arrange more frequent communication (online or in different sub-groups) to make your project a success!*

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Advice for agile development

Pair programming

- Driver types and thinks tactically about current task, explaining thoughts while typing
- Observer reviews each line of code as typed, and acts as safety net for the driver
- Observer thinking strategically about future problems, makes suggestions to driver

Should be lots of talking and concentration
Frequently switch roles

Pair programming evaluation

- Small increase in developer time (15%)
- Decrease in defects, i.e. higher quality
- Transfers knowledge between pair
  - Programming idioms, tool tricks, company processes, latest technologies, …
- Programmers often report increased job satisfaction

Williams et al. IEEE Software, 2000

Resolving conflicts (e.g. different views on the technical direction)

1. Remember there is no "winning", most questions don't have "right answers" just tradeoffs
2. List all items on which you agree
   - *Instead of starting with a list of disagreements*
   - *Maybe you agree more than you realize*
3. Articulate the other side's argument, even though you don't agree
   - *Avoids confusions about terms or assumptions (often the root cause of the conflict)*
4. Constructive confrontation (Intel)
   - *If you have a strong opinion that a proposal is technically wrong, you are obligated to speak up and seek a conclusion*
5. Disagree and commit (Intel)
   - *Once a decision is made, embrace it and move ahead*

See also: K Matsudaira, Resolving Conflict. Don't "win." Resolve. ACM Queue 14(5) 2016

Agile and code reviews

- Pair programming is a continuous review
- *Pull Requests* instead of/as a review
  1. Requests to integrate code
  2. Team sees each PR and determine how PR might affect own code
  3. Comment on concerns (or just “LGTM”)
  4. Since occurs daily, “mini-reviews” continuously

At Google, no commit to trunk without review

What are we looking for as the reviewer?

- !Formatting (ESLint’s/Prettier’s job)
- Leaky abstractions (forcing my implementation on my users…)
- Hard to maintain code
  - Duplicated code (not DRY)
  - Overly complex code
  - Global variables and other “foot guns”
  - Poor variable names and needed comments
- Insufficient tests, e.g. missing corner cases

How to write reviews

…and not alienate anyone on your team

- Accept that many programming decisions are opinions. Discuss tradeoffs, which you prefer, and reach a resolution quickly.
- Ask good questions; don't make demands. ("What do you think about naming this :user_id?")
- Good questions avoid judgment and avoid assumptions about the author's perspective.
- Ask for clarification. ("I didn't understand. Can you clarify?")
- Avoid selective ownership of code. ("mine", "not mine", "yours")
- Avoid using terms that could be seen as referring to personal traits. ("dumb", "stupid"). Assume everyone is intelligent and well-meaning.
- Be explicit. Remember people don't always understand your intentions online.
- Be humble. ("I'm not sure - let's look it up.")
- Don't use hyperbole. ("always", "never", "endlessly", "nothing")
- Don't use sarcasm.

https://github.com/thoughtbot/guides/tree/master/code-review

Commandments for being a bad SW team player (and some alternatives)

1. Those fails don’t matter	1. Never push failing tests
2. My branches, my sanctuary	2. Have short-lived branches by integrating frequently
3. It’s just a simple change	3. Test everything
4. I am a special snowflake	4. One coding style
5. Cleverness is impressive	5. Transparency is humble
6. Just change it quickly on the production server	6. Make every change automatable
7. Time spent looking stuff up is wasted time (not coding)	7. Spend 5 minutes searching for less or better code
8. “Green fever”: Catch it!	8. More tests ≠ higher quality
9. Weeks of coding can save hours of planning & thought	9. Work through your design

Organize and centralize your work

- React has a single source of truth, so should your project
  - •One central source repository
  - •One central source of project information (instead of random Google Docs, etc.)
- Maintain self-contained dev. environment
  - •Check-in DB, Travis, Heroku configurations
  - •Use `package.json` scripts to launch dev, tests, etc. with single shared command

Don’t build up technical debt!

- It is OK to require changes to a PR
- Any branch with lifetime > 3 days is killed
- Any merge that breaks the build is killed, and culprit **must** rebase against master
- Any bug fix or new code submitted without high test coverage (e.g. 90%) is rejected