CEN 5016: Software Engineering

Fall 2024



Dr. Kevin Moran

Week 3 - Class 11: Software Teams & Communication





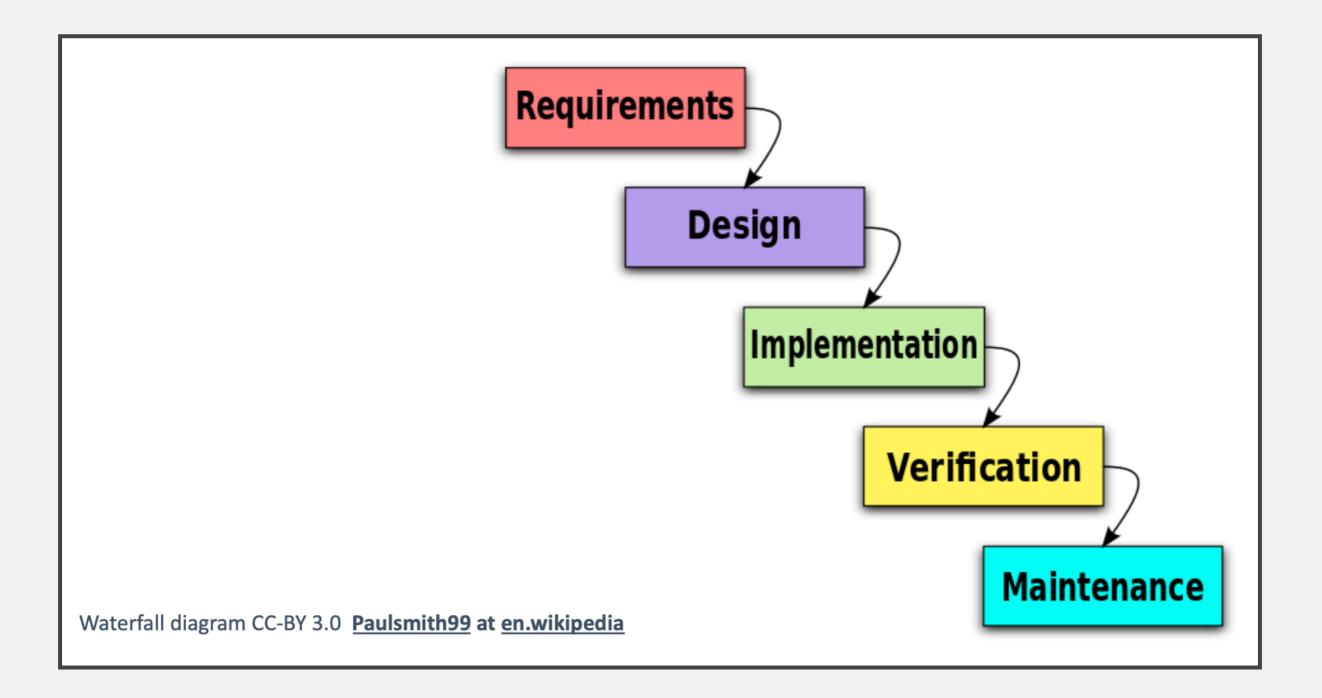


- Team-forming this week Due Thursday, Sept 12th EoD!!
  - Teams of 3 students
  - See Ed Discussions Post
- Assignment 2 Coming Soon!
  - Probably End of the Day today/tomorrow morning
  - May adjust due date to give more time









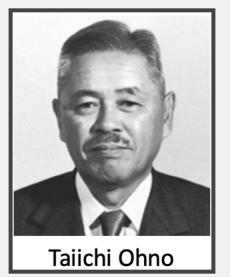
## Akin to Processes Pioneered in Auto Manufacturing by Ford

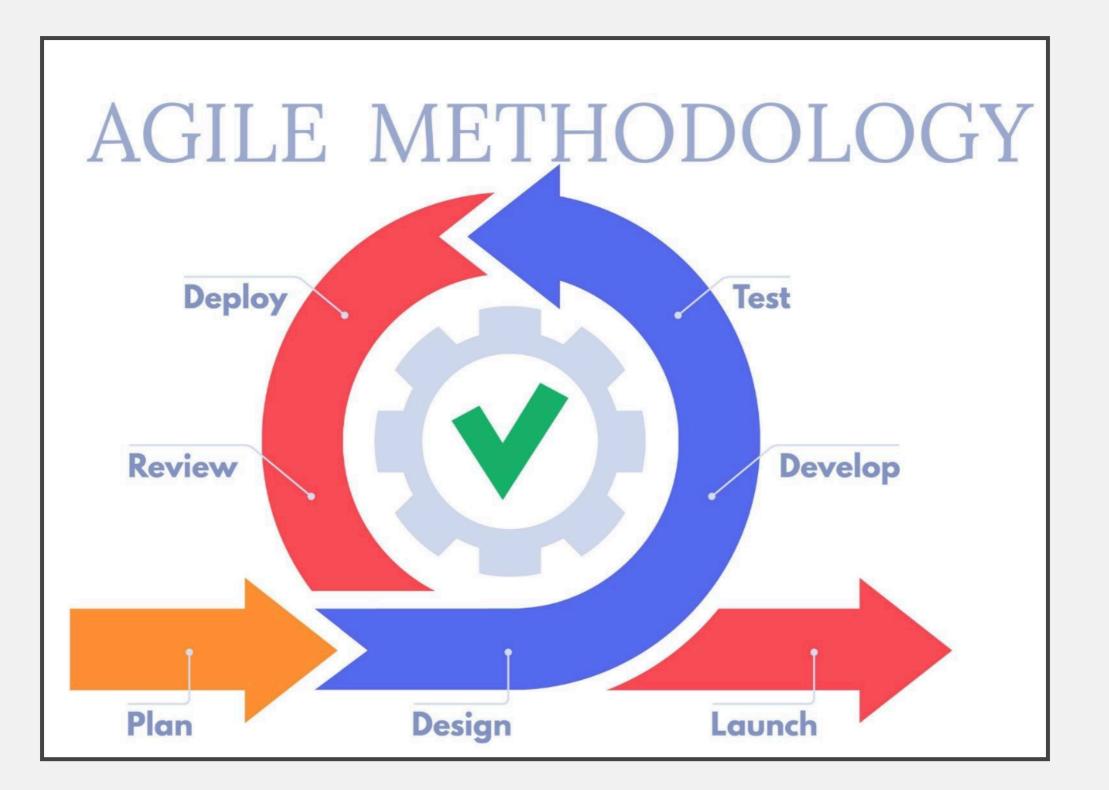




### LEAN Production Adapts to Variable Demand

- Toyota Production System (TPS)
  - Build only what is needed, only when it is needed.
  - Use the "pull" system to avoid overproduction (Kanban)
  - Stop to fix problems, to get quality right from the start (Jidoka)
  - Workers are multi-skilled and understand the whole process; take ownership
- Lots of recent software buzzwords build on these ideas
  - Just-in-time, DevOps, Shift-Left

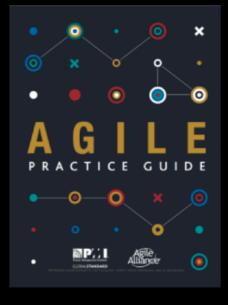






#### Agile software development

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



Manifesto for Agile Software Development (2001)



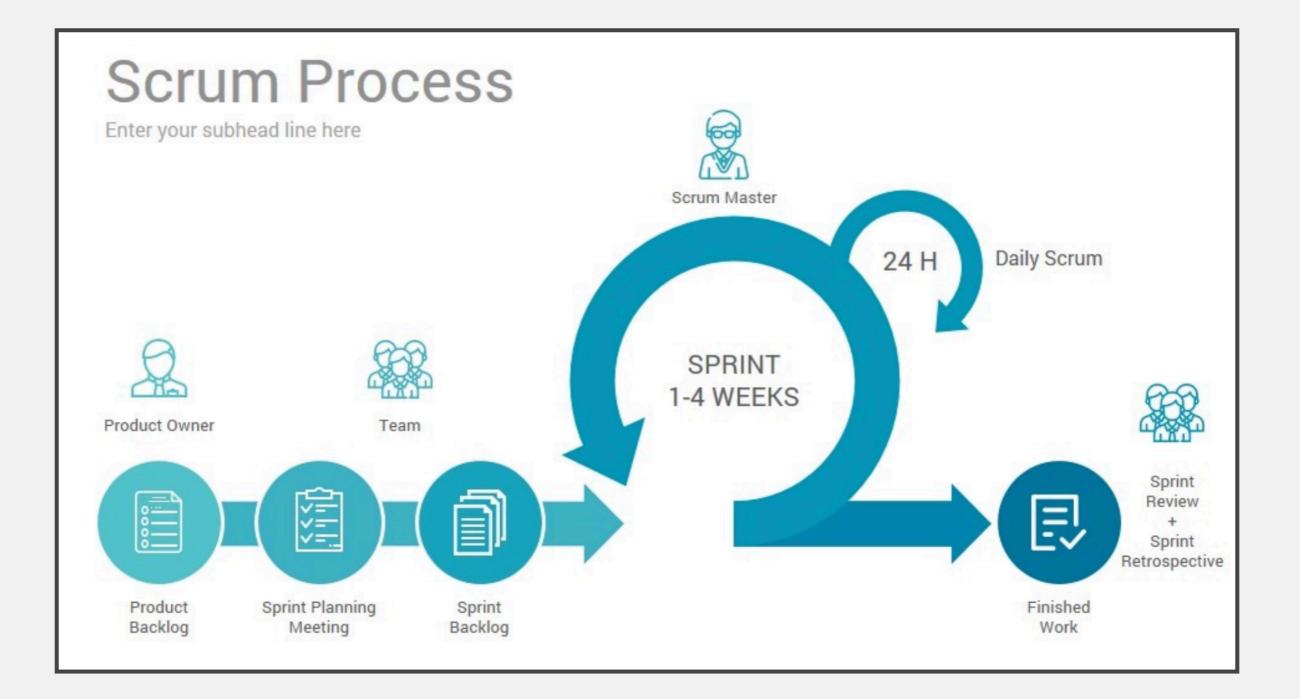
Core concepts	Facets of agility in the literature
(1) Incremental design and iterative development	<u>Anticipating</u> change by working iteratively – in short, delivery cycles – and thereby reducing the scope of the product to small increments to create opportunities for inspection; <u>Creating</u> change through incremental software design in <u>response to</u> change from what has been <u>learned</u>
(2) Inspect and adapt cycles	<u>Anticipating</u> change by instituting ceremonies for inspecting and adapting (i.e., <u>learning from</u> and <u>creating change in response to</u> discovered changes) the product increment (e.g., simplifying – "just enough" – design, testing software frequently) and the development process (e.g., updating work statuses, reevaluating team processes, reprioritizing requirements)
(3) Working cooperatively/ Collaboratively/In close communication	<u>Anticipating</u> change through recognising and predicting changes in one's environment; <u>Creating</u> change as a team by working together to <u>respond to</u> change from what has been <u>learned</u> collectively
(4) Continuous customer involvement	In addition to the cell above, centralising user requirements changes by working together with the customer to collectively identify and <u>respond to</u> change early through close customer involvement





#### **Elements of Scrum**



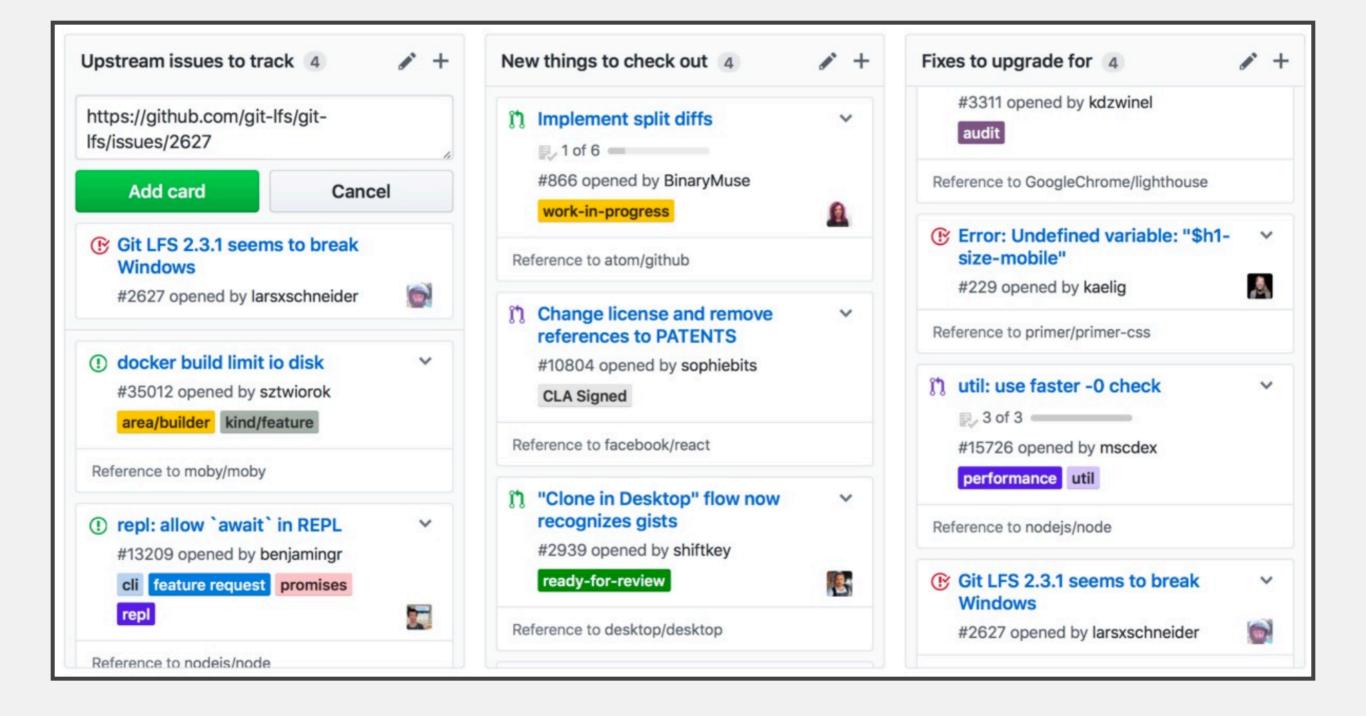






- The product backlog is all the features for the product
- The sprint backlog is all the features that will be worked on for that sprint. These should be broken down into discrete tasks:
  - Fine-grained
  - Estimated
  - Assigned to individual team members
  - Acceptance criteria should be defined
- User Stories are often used





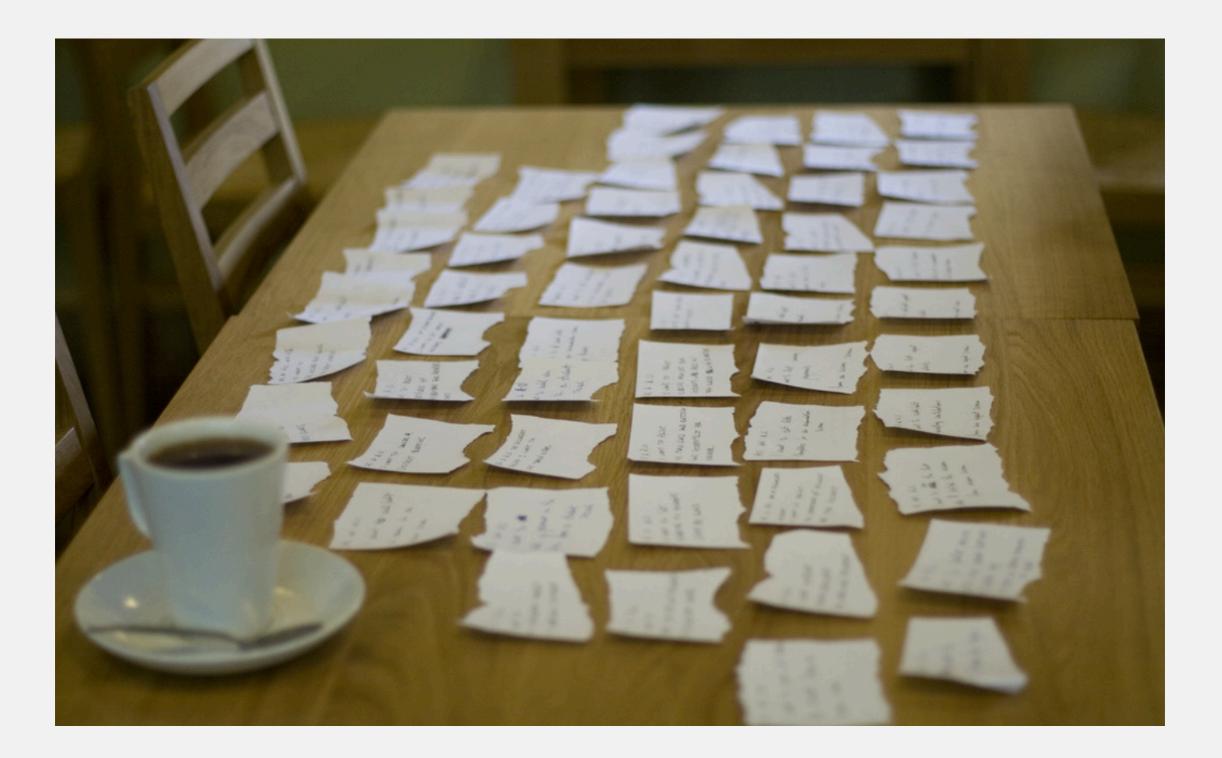
# Scrum Meetings



- Sprint Planning Meeting
  - Entire Team decides together what to tackle for that sprint
- • Daily Scrum Meeting
  - Quick Meeting to touch base on :
  - What have I done? What am I doing next? What am I stuck on/need help?
- Sprint Retrospective
  - Review sprint process
- Sprint Review Meeting
  - Review Product

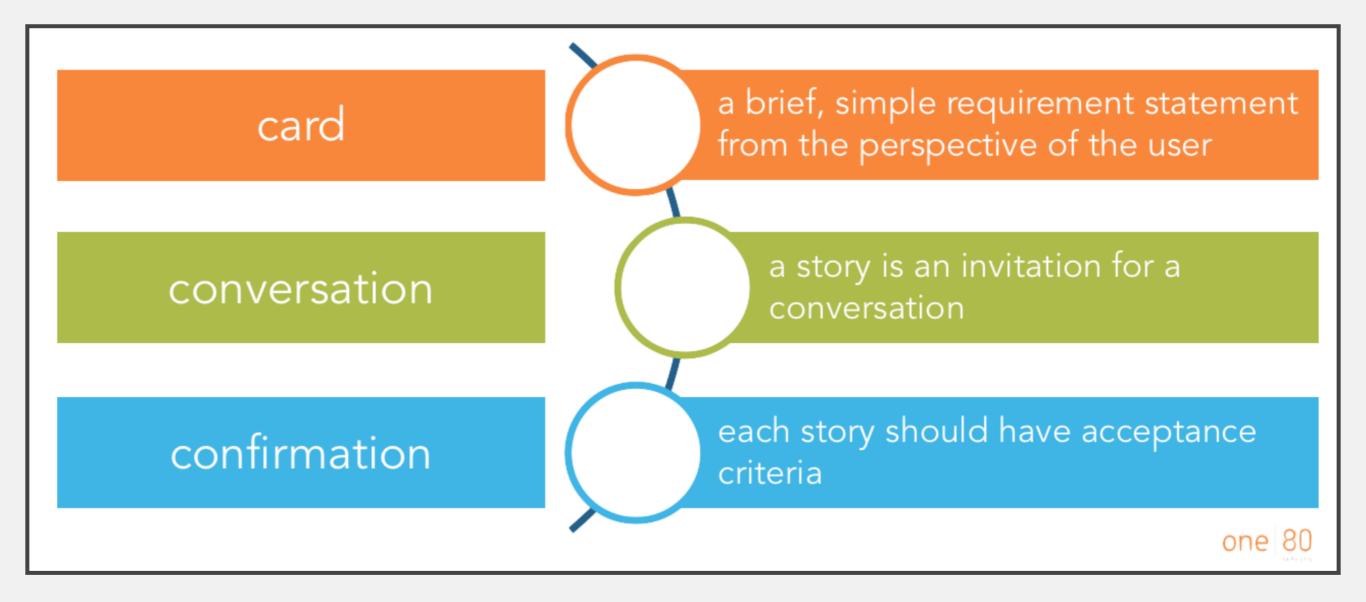
## User Stories





## User Stories









• "As a [role], I want [function], so that [value]"





• What must a developer do to implement this user story?

## Confirmation



- How can we tell that the user story has been achieved
- It's easy to tell when the developer finished the code.
- But, how do you tell that the customer is happy?





## Independent

- Schedule in any order.
- Not overlapping in concept.
- Not always possible.





#### Negotiable

- Details to be negotiated during development.
- A good story captures the essence, not the details.





#### Valuable

- This story needs to have value to someone (hopefully the customer).
- Especially relevant to splitting up issues.





### Estimable

- Helps keep the size small.
- Ensure we negotiated correctly.
- "Plans are nothing, planning is everything" - Dwight D. Eisenhower









- Can be written on a 3x5 card.
- At most two person-weeks of work.
- Too big === unable to estimate

I	independent	
Ν	negotiable	
V	valuable	
Е	estimable	
S	small	
Т	testable	

#### Testable

- Ensures understanding of task
- We know when we can mark task "Done"
- Unable to test === I do not understand it





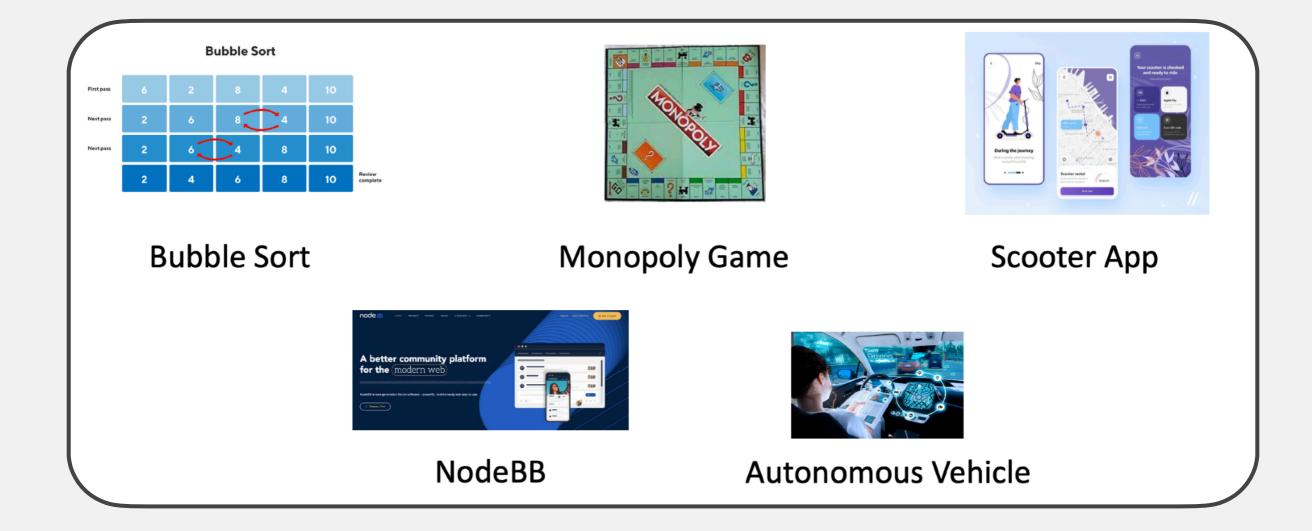
# Software Teams & Communication





- Describe the pros and cons of working as a team
- Recognize the importance of communication in collaboration
- Recognize the need of having multiple communication channels
- Select an appropriate communication tool for a given communication goal
- Ask technical questions effectively
- Write clear and specific Github issues, pull requests, and comments







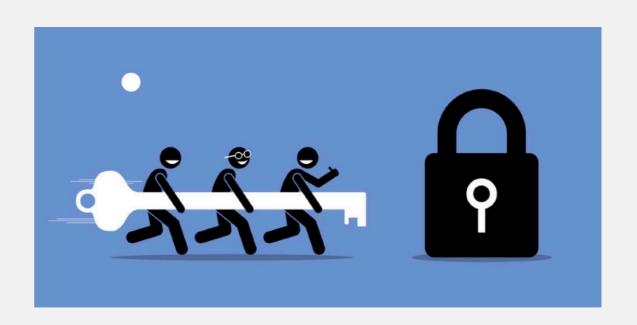


# Working as a Team

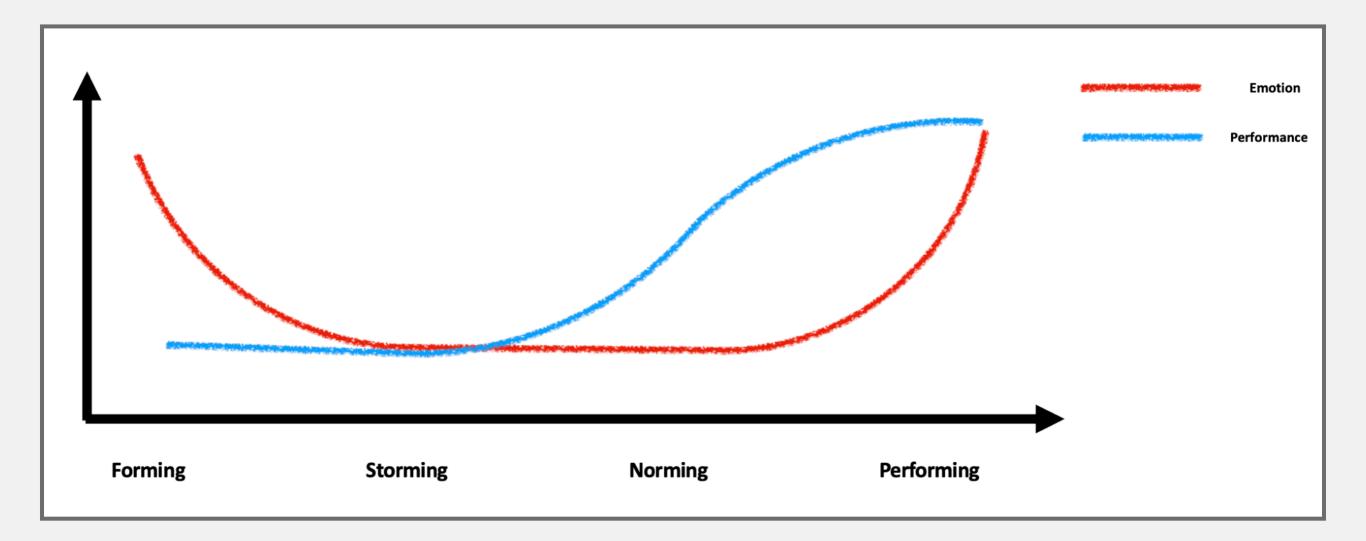


- Design & implement software
  - Establish a collaboration process
  - Meet with the team
  - Choose a leader
  - Divide work and integrate
  - Share knowledge
  - Resolve conflicts









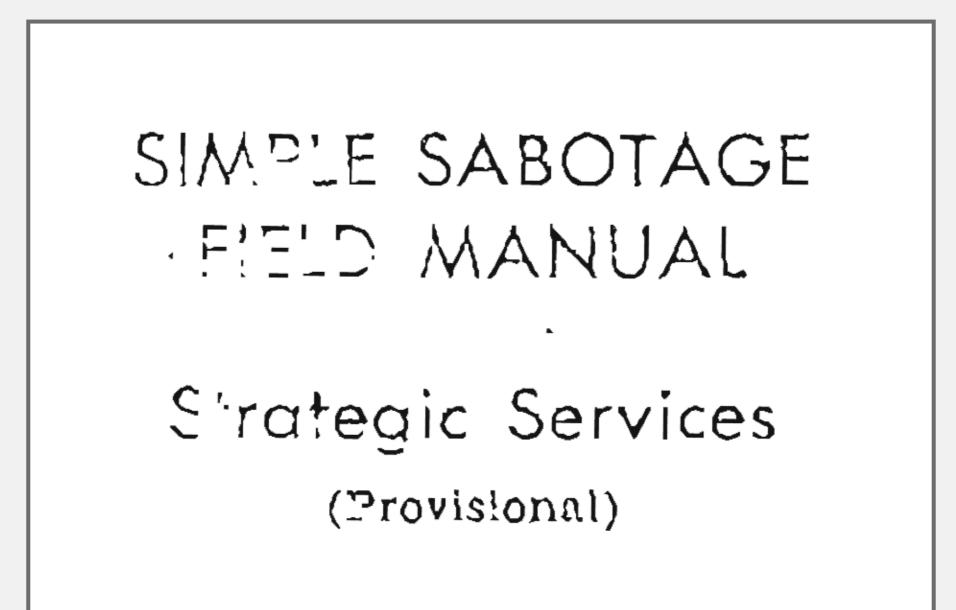




- When working with someone who is remote, how do you like to work together?
- How do you manage your time when you get busy with a lot of tasks?
- How do you feel about chatting by text message, audio call, video call?
  - Exchange phone numbers with your project partner(s) in case your Internet goes out and you still want to work on the project together.
- Negotiate when you can work on the project together outside of class.
- Have you had a positive prior teaming experience?
  - How often did your team meet?
  - Did your team have a leader? If yes, what did that leader do?
  - What was your role on the team?
  - How well did you get along with your teammates related to work, or related to non-work?







## What Not to Do 🧐



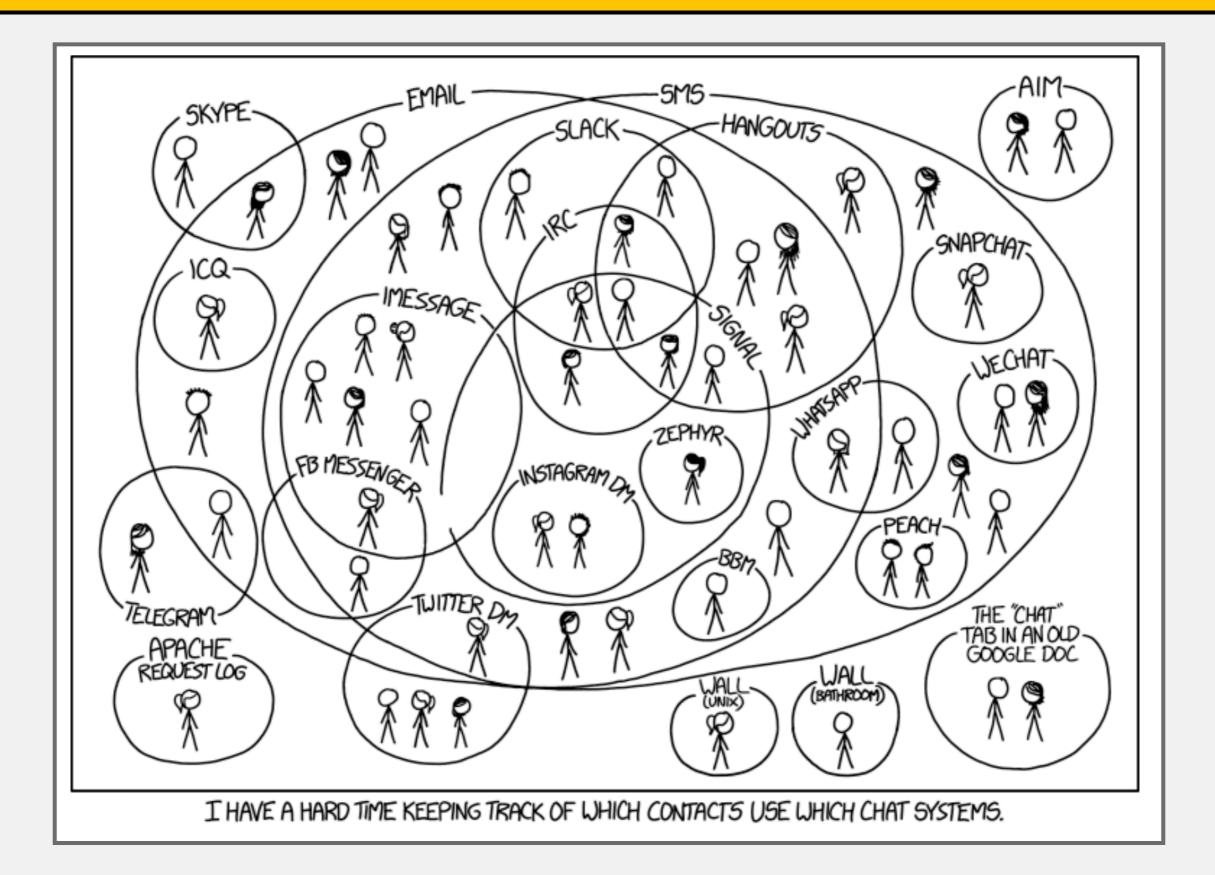
(12) Multiply paper work in plaueible wave (3) Even if you understand the language (b) Managers and Supervisors Start duplicate files. (11) General Interfere pretend not to understand instructions in Production (1) Demand written order (13) Multiply the procedur foreign tongue. involved in issuing instructions (a) Organizations (2) "Misunderstand" orde (4) Pretend that instructions are hard to so on. See that three people (1) Insist or questions or engage in long understand, and ask to have them repeated more everything where one would do "channels." Never than once. Or pretend that you are particularly about such orders. Quibble over (14) Apply all regulations anxious to do your work, and pester the foremar in order to expedi can. with unnecessary questions. (2) Make "sp (c) Office Workers (3) Do everything possible (5) Do your work poorly and blame it or possible and at (1) Make mistakes in qua bad tools, machinery, or equipment. Complair delivery of orders. Even though "points" by long a when you are copying orders that these things are preventing you from doing may be ready beforehand, don' sonal experiences. names. Use wrong addresses. your job right. it is completely ready. appropriate "patr (2) Prolong corresponded (6) Never pass on your skill and experience (3) When p (4) Don't order new wo ment bureaus. to a new or less skillful worker. committees, for until your current stocks have b (7) Snarl up administration in every pos-(3) Misfile essential docu tion." Attempt to sible way. Fill out forms illegibly so that they hausted, so that the slightest (4) In making carbon co as possible — nev will have to be done over; make mistakes or omit your order will mean a shutdo few, so that an extra copying (4) Bring up requested information in forms. be done. (5) Order high-quality ma as possible. (8) If possible, join or help organize a group (5) Tell important caller hard to get. If you don't get th for presenting employee problems to the man-(5) Haggle or talking on another teleph agement. See that the procedures adopted are munications, min it. Warn that inferior materia (6) Hold up mail until t as inconvenient as possible for the management, (6) Refer ba ferior work. involving the presence of a large number of (7) Spread disturbing  $\Pi$ the last meeting  $(\underline{6})$  In making work assign employees at each presentation, entailing more like inside dope. question of the a than one meeting for each grievance, bringing sign out the unimportant job (7) Advocate (d) Employees up problems which are largely imaginary, and the important jobs are assign and urge your f (1) Work slowly. Think so on. workers of poor machines. able" and avoid crease the number of movem (9) Misroute materials. embarrassments (7) Insist on perfect work your job: use a light hammer (10) Mix good parts with unusable scrap and important products; send back (8) Be worr one, try to make a small wrei rejected parts. decision — raise those which have the least flav one is necessary, use little for General Devices for Lowering Morale and Creataction as is cont able force is needed, and so o defective parts whose flaws a onfusion diction of the gro (2) Contrive as many int the naked eye. (a) Give lengthy and incomprehensible explawith the policy o work as you can: when char (8) Make mistakes in rout tions when questioned. on which you are working, and materials will be sent to th (b). Report imaginary spies or danger to the lathe or punch, take needles tana ar malice 36

## Establish a Collaboration Process



#### **Communication App Confusion**





## Select the Right Communication Tools





#### Establish Communication Patterns



- Asana, Trello, Microsoft Projects, ...
- Github Wiki, Google Docs, Notion, ...
- Github Issues, Jira, ...
- Email, Slack, Facebook groups, ...
- Zoom, Microsoft Teams, Skype, Phone call, ...
- Face-to-face meetings

## CEN 5016 Communication Channels



- Ed Discussions
- Regular meeting (Lectures, Recitations)
- Office Hours
- Webcourses
- Course Webpage



#### Communication

- Forums: Discuss implementations, research, etc. https://discuss.pytorch.org
- GitHub Issues: Bug reports, feature requests, install issues, RFCs, thoughts, etc.
- Slack: The PyTorch Slack hosts a primary audience of moderate to experienced PyTorch users and developers for general chat, online discussions, collaboration, etc. If you are a beginner looking for help, the primary medium is PyTorch Forums. If you need a slack invite, please fill this form: https://goo.gl/forms/PP1AGvNHpSaJP8to1
- Newsletter: No-noise, a one-way email newsletter with important announcements about PyTorch. You can sign-up here: https://eepurl.com/cbG0rv
- Facebook Page: Important announcements about PyTorch. <a href="https://www.facebook.com/pytorch">https://www.facebook.com/pytorch</a>
- For brand guidelines, please visit our website at pytorch.org



- Quality of service guarantee
  - How soon will you get back to your teammates?
  - Weekend? Evening?
- Emergency
  - Tag w/ 911
  - Notify everyone with @channel







- The Three Rules of Running a Meeting
  - Set the Agenda
  - Start on Time. End on Time.
  - End with Action Items (and share them Github Issues, Meeting Notes, ...)



- Set and document clear responsibilities and expectations
- Make everyone contribute
  - Possible Roles: Coordinator, Scribe, Checker
  - Manage Personalities
  - Be Vulnerable

#### Atlassian Meeting Flowchart







- Note: these are not the same thing.
- A leader inspires with their vision of how everyone could work together.
  - They maintain a positive working environment.
  - They actively create their team culture.
  - They promote fair play among team members.
  - They acknowledge their team members' individuality.
  - They are humble and understand that others may know more than they do.

#### How to be a Great Manager



- Managers handle work assignments and day-to-day scheduling.
- Managers find resources to support their team's tasks.
- Managers continuously improve their team's processes.
- Managers allow team members to work autonomously, without micromanaging them.
- Managers facilitate communicate between team members.



- Some leaders are respected for technical excellence.
- Some leaders are chosen based on past accomplishments.
- Some leaders have high EQ (emotional quotient) and earn everyone's trust.
- Some leaders *take* the position through force of will and because others acquiesce.

#### Why do you want to be team leader?

## Divide Work and Integrate



#### Is this Issue Useful?



	calebsylvest opened this issue just now · 0 comments	
0.	calebsylvest commented just now	Labels 🔅
	The image slider is broken	bug
		Milestone 🌣
0.	Write         Preview         Comments are parsed with GitHub Flavored Markdown	
	Leave a comment	Assignee
		Notifications (?)
	Attach images by dragging & dropping, selecting them, or pasting from the clipboard.	◀× Unsubscribe
	Close Comment	1 participant



Cro	oping of Image Slider Pics #3	Edit New iss	ue <>
() Ope	n calebsylvest opened this issue just now · 0 comments		0
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	http://calebsylvest.com/	bug	
	The cropping of the images in the slideshow seem to be off. The text is not visible and partially hidden by content below. The Developer Tools show the full-size un-cropped image is being loaded, but obviously not displaying.	Milestone No milestone	☆ ≁
	Browser: Google Chrome OS: Mavericks	Assignee	¢
	Hardware: MacBook Pro Retina	Notifications	· · · · · · · · · · · · · · · · · · ·
	Image: Second	◀× Unsubscribe	•



- Issue should include
  - Context: explain the conditions which led you to write the issue
  - Problem or idea: the context should lead to something
  - Previous attempts to solve
  - Solution or next step (if possible)
- Be specific!
  - Include environment settings, versions, error messages, code examples when necessary

## @Mention or Assign Appropriate People



	game to use new rendering engine	Assignees C octocat	<u>ت</u> ې
Write H B	Preview $I  i \equiv \langle \rangle  \mathcal{O}  i \equiv \frac{1}{2} \equiv \mathcal{O}  \bigcirc  \mathcal{O}  \checkmark  \square$	Labels enhancement	绞 # space game
	Now that we've decided on our new rendering engine (see #824), we need to update our collision ogic to use the engine, build an engine prototype, and update the game logic.		يې نې
	://github.com/octo-org/octo-repo/issues/1752 ate aliens and cannon game logic	Milestone beta release	τ <u>ό</u> τ
Attach file	es by dragging & dropping, selecting or pasting them.	Linked pull request	
T Styling v	with Markdown is supported Submit new		ng a pull request may



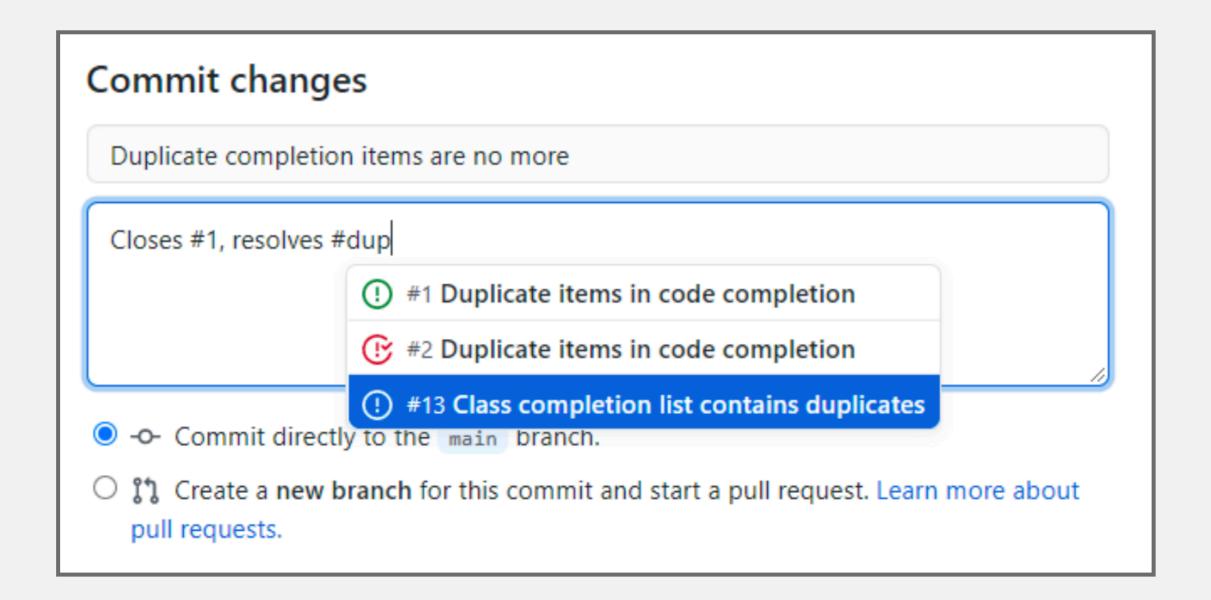


- Break the project down by areas of responsibility
- Mark non-triaged issues
- Isolate issues that await additional information from the reporter
- Example:
  - Bug / Duplicate / Documentation / Help Wanted / Invalid / Enhancement
  - status: wip, status: ready to implement, status: needs discussion

## Don't Forget to Follow Up and Close Issues

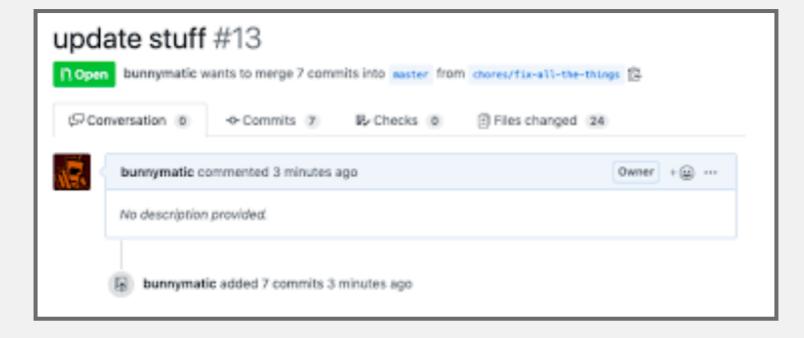


closes/resolves #issue\_number



#### Pull Requests







## What?
## Why?
## How?
## Testing?
## Screenshots (optional)
## Anything Else?

#### How to Write Good Pull Requests



```
## What?
I've added support for authentication to implement Key Result 2 of OKR1. It includes model, table,
controller and test. For more background, see ticket
#JIRA-123.
## Why?
These changes complete the user login and account creation experience. See #JIRA-123 for more
information.
## How?
This includes a migration, model and controller for user authentication. I'm using Devise to do the
heavy lifting. I ran Devise migrations and those are included here.
## Testing?
I've added coverage for testing all new methods. I used Faker for a few random user emails and
names.
## Screenshots (optional)
0
## Anything Else?
Let's consider using a 3rd party authentication provider for this, to offload MFA and other
considerations as they arise and as the privacy landscape evolves. AWS Cognito is a good option, so
is Firebase. I'm happy to start researching this path. Let's also consider breaking this out into
its own service. We can then re-use it or share the accounts with other apps in the future.
```



- Remember that anyone (in the company) could be reading your PR
- Be explicit about what/when feedback you want
- @mention individuals that you specifically want to involve in the discussion, and mention why.
  - "/cc @jesseplusplus for clarification on this logic"



...



I Am Devloper @iamdevloper

10 lines of code = 10 issues.

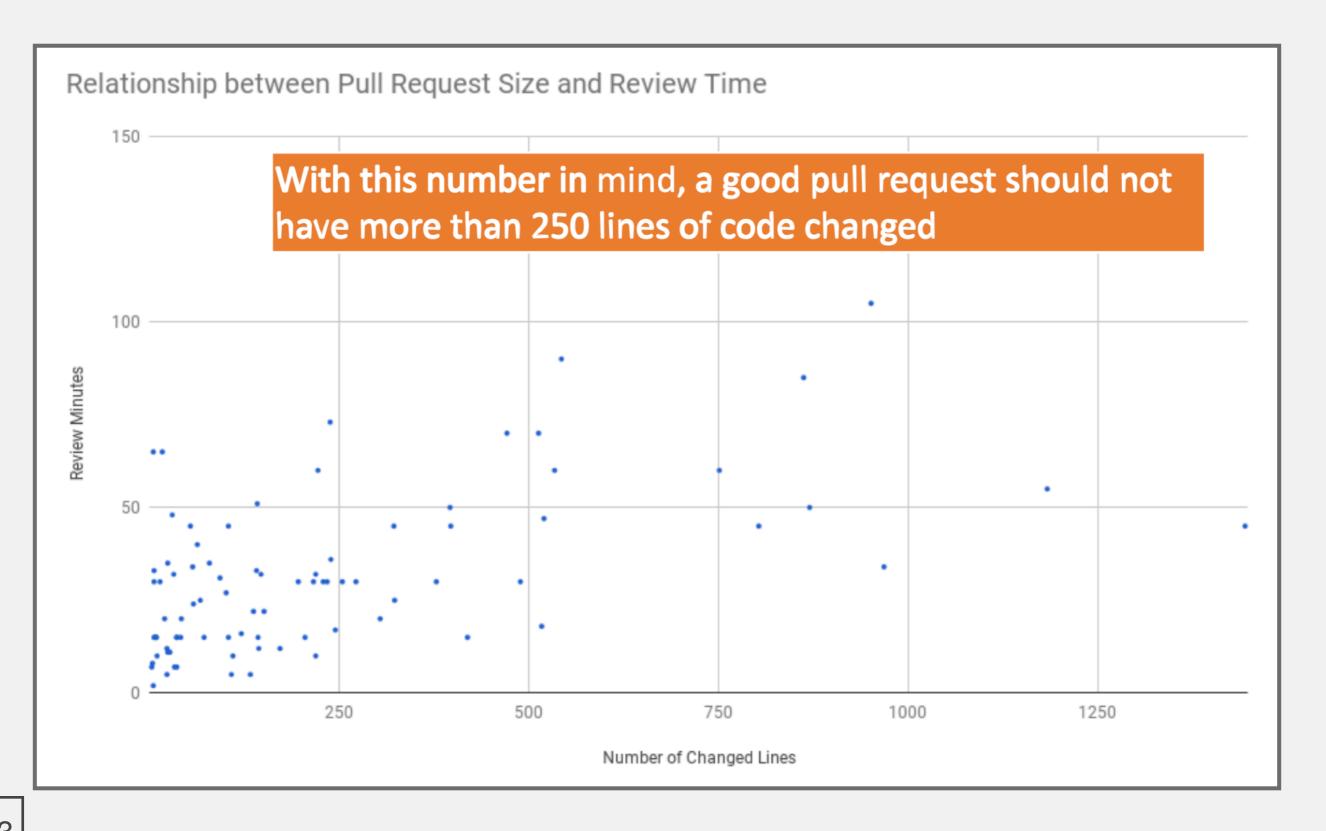
500 lines of code = "looks fine."

#### Code reviews.

4:58 AM · Nov 5, 2013 · Tweetbot for iOS

8,258 Retweets 171 Quote Tweets 6,794 Likes







- If you disagree strongly, consider giving it a few minutes before responding; think before you react.
- Ask, don't tell. ("What do you think about trying...?" rather than "Don't do...")
- Explain your reasons why code should be changed. (Not in line with the style guide? A personal preference?)
- Be humble. ("I'm not sure, let's try...")
- Avoid hyperbole. ("NEVER do...")
- Be aware of negative bias with online communication.



• "Duplicate of" issue/pull request number

<b>.</b>	octocat commented 4 minutes ago	Owner + 🙂 🥜
	We should update our README.md file to include new team members.	
	megbird commented 4 minutes ago	Owner + 😄 🥕 🗙
	Duplicate of #4	
	megbird marked this as a duplicate of #4 4 minutes ago	Undo



```
Date
           Sat, 13 Jul 2013 15:40:24 -0700
                                                                            💮 share
                                                                                          638
Subject Re: [GIT pull] x86 updates for 3.11
           Linus Torvalds <>
From
On Sat, Jul 13, 2013 at 4:21 AM, Thomas Gleixner <tglx@linutronix.de> wrote:
>
     * Guarantee IDT page alignment
>
What the F*CK, guys?
This piece-of-shit commit is marked for stable, but you clearly never
even test-compiled it, did you?
Because on x86-64 (the which is the only place where the patch
matters), I don't see how you could have avoided this honking huge
warning otherwise:
  arch/x86/kernel/traps.c:74:1: warning: braces around scalar
initializer [enabled by default]
   gate desc idt table[NR VECTORS] __page_aligned_data = { { { { { { { { { 0, 0 } } } } } } } } };
```





#### Importance of Documentation



#### No matter the format, documentation is important

Building on top of others' work in a communitylike way can be an accelerator, both in open source and in companies. Documentation often signals if a repository is reliable to reuse code from, or if it's an active project to contribute to. What signs do developers look for?

In both open source projects and enterprises, developers see about

50%

productivity boost with easy-tosource documentation What the data shows: At work, developers consider documentation trustworthy when it is up-to-date (e.g., looking at time-stamps) and has a high number of upvotes from others. Open source projects use READMEs, contribution guidelines, and GitHub Issues, to elevate the quality of any project, and to share information that makes them more attractive to new contributors. Enterprises can adopt the same best practices to achieve similar success.

In both environments, developers see about a 50% productivity boost when documentation is up-to-date, detailed, reliable, and comes in different formats (e.g. articles, videos, forums).

**Using the data:** Review the documentation your team consumes: When was the last time it was updated? Can everyone on your team improve the documentation? Check this frequently to stay on track.

## Types of Documentation



Knowledge Type	Description (Excerpt)
Functionality and Behavior	Describes what the API does (or does not do) in terms of functionality or features. Describes what happens when the API is used (a field value is set, or a method is called).
Concepts	Explains the meaning of terms used to name or describe an API element, or describes design or domain concepts used or implemented by the API.
Directives	Specifies what users are allowed / not allowed to do with the API element. Directives are clear contracts.
Purpose and Rationale	Explains the purpose of providing an element or the rationale of a certain design decision. Typically, this is information that answers a "why" question: Why is this element provided by the API? Why is this designed this way? Why would we want to use this?
Quality Attributes and Internal Aspects	Describes quality attributes of the API, also known as non-functional requirements, for example, the performance implications. Also applies to information about the API's internal implementation that is only indirectly related to its observable behavior.
Control-Flow	Describes how the API (or the framework) manages the flow of control, for example by stating what events cause a certain callback to be triggered, or by listing the order in which API methods will be automatically called by the framework itself.
Structure	Describes the internal organization of a compound element (e.g. important classes, fields, or methods), information about type hierarchies, or how elements are related to each other.
Patterns	Describes how to accomplish specific outcomes with the API, for example, how to implement a certain scenario, how the behavior of an element can be customized, etc.
Code Examples	Provides code examples of how to use and combine elements to implement certain functionality or design outcomes.
Environment	Describes aspects related to the environment in which the API is used, but not the API directly, e.g., compatibility issues, differences between versions, or licensing information.
References	Includes any pointer to external documents, either in the form of hyperlinks, tagged "see also" reference, or mentions of other documents (such as standards or manuals).
Non-information	A section of documentation containing any complete sentence or self-contained fragment of text that provides only uninformative boilerplate text.

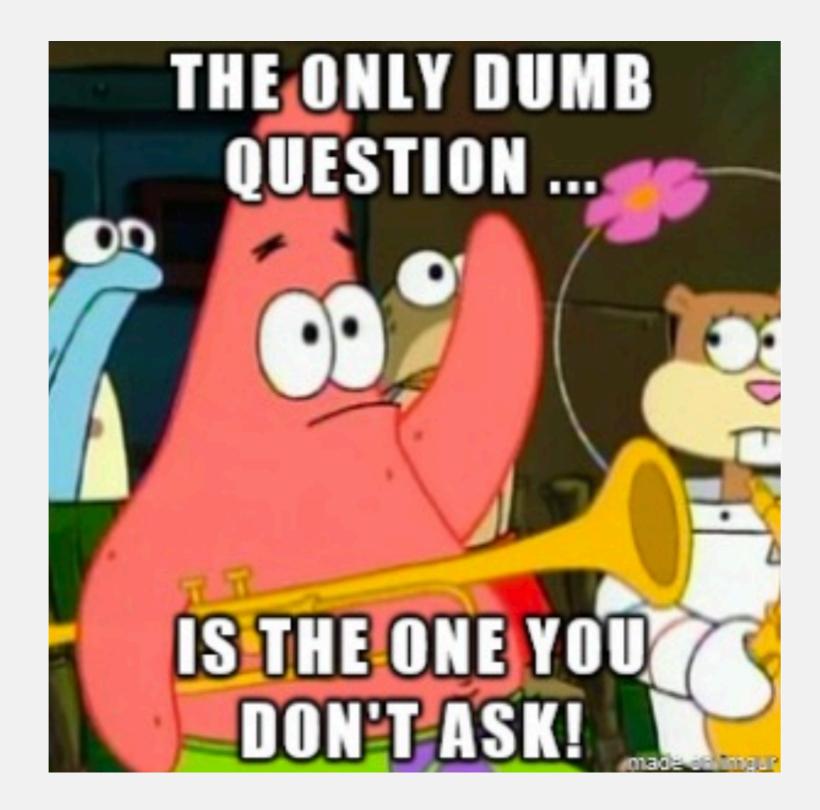
Maalej, W., & Robillard, M. P. (2013). Patterns of knowledge in API reference documentation. IEEE Transactions on Software Engineering, 39(9), 1264-1282.



- Internal document for your team (e.g., meeting note)
- Documentation for project contributors
- Documentation for non-developer collaborators (e.g., UX researchers)
- Documentation for developer users
- Documentation for clients with no software knowldge
- User manual for end users

#### Importance of Asking Questions







#### New To Coding. Can anyone assist me?

Asked 7 years, 1 month ago Modified 7 years, 1 month ago Viewed 47 times

I am trying to make a word counter and I just cant seem to get it. Can anyone help?



-4

R

```
import re
print("Welcome To This Software Made By Aaron!")
word = raw_input("Enter Your Words: ")
Check = 0
Right = 0
Length = len(word)
while True:
    if Right == 1:
        if Length < Check:
            Check = Check + 1
            print(Check)
    if Length == Check:
        Right = 1
print("Your Word Count Is " +Check)</pre>
```





• I am trying to \_\_\_\_, so that I can \_\_\_\_. I am running into

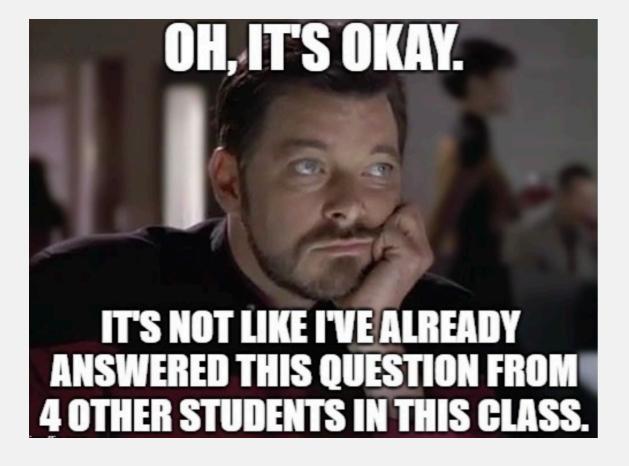
I have looked at \_\_\_\_ and tried \_\_\_\_.

- + I'm using this tech stack: \_\_\_\_.
- + I'm getting this error/result: \_\_\_\_.
- + I think the problem could be \_\_\_\_.

## Avoid Duplication



# RESEARCH-ARTICLE Mining duplicate questions in stack overflow Authors: Muhammad Ahasanuzzaman, Muhammad Asaduzzaman, Muhammad Asaduzzaman, Chanchal K. Roy, Kevin A. Schneider



Published: 04 November 2015

Studying the needed effort for identifying duplicate issues

Mohamed Sami Rakha ⊠, Weiyi Shang & Ahmed E. Hassan

Empirical Software Engineering 21, 1960–1989 (2016) Cite this article 748 Accesses 19 Citations 1 Altmetric Metrics

#### Abstract

Many recent software engineering papers have examined duplicate issue reports. Thus far, duplicate reports have been considered a hindrance to developers and a drain on their resources. As a result, prior research in this area focuses on proposing automated approaches to accurately identify duplicate reports. However, there exists no studies that attempt to





#### Resolving Conflicts



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## crucial conversations

THIRD EDITION



TOOLS FOR TALKING WHEN STAKES ARE HIGH

JOSEPH GRENNY • KERRY PATTERSON • RON McMILLAN AL SWITZLER • EMILY GREGORY



#### Communication

#### Communication

# You can't solve any Problem without Communication!

#### Communication

Communication



- Your goal: Find a solution to the problem and move forward.
  - As a smart person on "TedLasso" once said, "Fight forward, not back."
- Make sure that everybody works from the same set of facts.
- Establish ground rules for your team's discussion.
  - Talk about how the situation made you feel.Never presume anything about anyone else.
- Remain calm and rational. If you feel triggered or threatened, extract yourself from the situation, wait an hour to chill out, and then try again.
- If you reach an impasse, talk to your team leader.
- If your team remains in conflict, escalate to Dr. Moran.
  - I can help to mediate