

Peer Code Review for Scientific Software



Jeffrey C. Carver
University of Alabama

Collegeville 2020



```
// file: IVR.CPP
void IVR()
1 {
2     //press 1 for account balance, 2 for last transaction,
3     //3 for last statement, any other for operator
4     play_prompt();
5
6
7     int key_pressed= get_user_choice();
8     if(key_pressed ==1)
9     {
10         play_account_balance();
11     }
12     else if(key_pressed =2)
13     {
14         play_last_transaction();
15     }
16
17     else if(key_pressed ==3)
18     {
19         play_last_statement();
20     }
21
22     else transfer_to_operator();
}
```

Assignment operator
instead of comparison

```
1 //file: printer.java
2 if (user.isAuthenticated)
3 {
4     userAccess = checkUserAuthorization(user);
5
6     //if user has access to printer
7     if(user.isAuthenticated && userAccess.printer)
8         printUsageReport ();
9     else
10         emailUsageReport ();
11 }
```

Redundant check

Do you think only novice developers
make these mistakes?

```
if (noMedia) {  
    // In case the file is known and now is under a  
    // .nomedia folder mark as not seen in order to  
    // be removed from files table in the post scan.  
    if (entry != null && noMedia) {
```

478
479
480
481
482

Jan 15, 2012

Isn't '&& noMedia' redundant? noMedia can only be true inside the if block.

Reply ...

Reply 'Done'

Jan 16, 2012

Thanks My bad :D

Reply ...

Reply 'Done'

```
        entry.mSeenInFileSystem = false;  
    }  
    return null;  
}
```

483
484
485
486
487

#13244

```
62 >> if ((nbytes=recvfrom(fd,msgbuf,MSGBUFSIZE,0,  
63 >> (struct sockaddr *) &addr,&  
64 >> perror("recvfrom");  
65 >> exit(1);  
66 >> }  
puts(msgbuf);
```

Feb 8, 2010

Isn't there a risk of msgbuf not being terminated? Reading all the way to MSGBUFSIZE seems to risk overwriting the implicit init done, or does the kernel always null-terminate the buffer, even if it is larger than MSGBUFSIZE?

I guess the worst case scenario is puts going off on a tangent, so probably not particularly dangerous, but still?

[Reply](#)

[Done](#)

Feb 9, 2010

You are absolutely right. I will change it to write() the number of bytes received. I only tested it with the other file (sender.c) which sends "Hello, world" with the null-byte attached. I will send a patch when I get home. Thanks for the review!



<https://twitter.com/noeabarcam/status/394749401283190784>

You might be an Internet 'solopreneur', a lone wolf who writes, edits, formats, checks and publishes your own content. Or you might work for a ~~company~~ website, either as a content creator or as a ~~production~~ editor, sub-editor or ~~editor~~ - the person in charge of quality control and tasked to edit/proofread work produced by your colleagues.

Not you? Maybe you want to self-publish a book on Amazon, check through a student essay or thesis, perhaps error-check a company report? Maybe you're involved in creating a brochure, newsletters, business cards, product packaging or signs? Not you either? What about sending an email, posting a Tweet or updating Facebook? They all involve words. Is everything you've typed recently correct? Are you certain?

It's not always easy to spot errors.

You might not have a proofreading process. Or you might be already be actively proofreading and want to get better at it.

And forgotten

If you publish or print words of any kind, you won't want any mistakes to slip through. You want to ensure that what you produce is the best that it can be. This is especially true if you are printing anything. Mistakes on the web can be corrected. You don't have that luxury with print. Print has permanency. Just think how you'd feel if you'd been the sign writer who painted 'SHCOOL' in big white letters on the road when you meant to spell 'SCHOOL'. Or that you'd given the OK to a sign that read 'DRIVE-THRU ENTERANCE'. These are real examples. You'll find more proofreading howlers like these later in this book.

Again, proofreading is an essential part of the publishing process. The larger the font, the more you should check it. The more permanent the publication or installation, the more you should check it. You should check and re-check everything you plan to publish until your eyes ache or until the words start to look incorrect and you have to look them up again just to make sure that you're not going crazy. And if you have time for a re-re-check, so much the better.

A brass balance scale is shown, with the left pan containing several coins. The scale is set against a black background. The text "Where does it fit?" is overlaid in yellow on the left side.

Where does it fit?

Other Activities

Code Review

Peer

Code

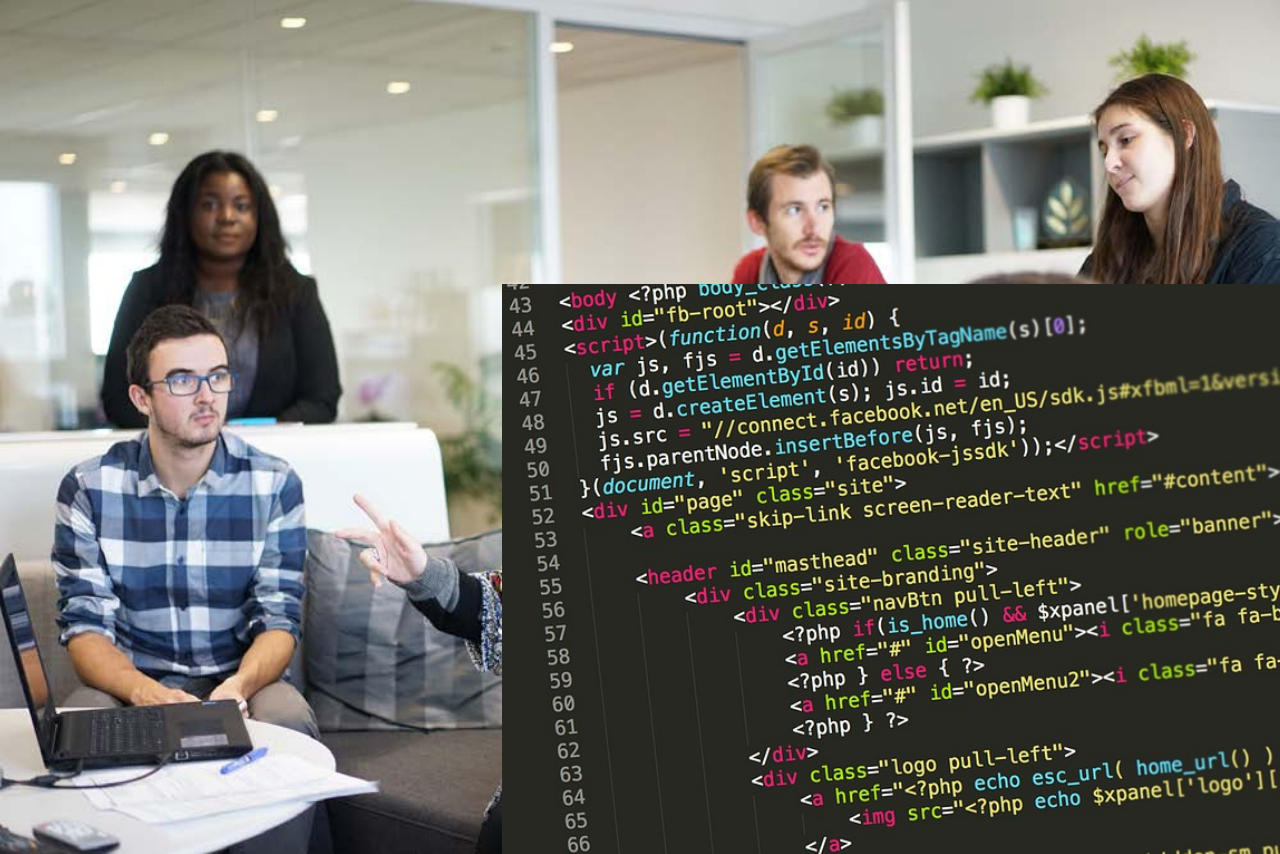
Review

Tutorial





Code Review Goals



```
43 <body <?php body_...></div>
44 <div id="fb-root"></div>
45 <script>(function(d, s, id) {
46   var js, fjs = d.getElementsByTagName(s)[0];
47   if (d.getElementById(id)) return;
48   js = d.createElement(s); js.id = id;
49   js.src = "//connect.facebook.net/en_US/sdk.js#xfbml=1&version=v2.6&appId=28864863628717";
50   fjs.parentNode.insertBefore(js, fjs);
51 })(document, 'script', 'facebook-jssdk');</script>
52 <div id="page" class="site">
53   <a class="skip-link screen-reader-text" href="#content"><?php esc_html_e( 'Skip to content', 'urduube' ); ?></a>
54
55   <header id="masthead" class="site-header" role="banner">
56     <div class="site-branding">
57       <div class="navBtn pull-left">
58         <?php if(is_home() && $xpanel['homepage-style'] == 1) { ?>
59           <a href="#" id="openMenu"><i class="fa fa-bars fa-3x">
60           <?php } else { ?>
61             <a href="#" id="openMenu2"><i class="fa fa-bars fa-3x">
62             <?php } ?>
63         </div>
64         <div class="logo pull-left">
65           <a href="<?php echo esc_url( home_url() ) ?>">
66             
67           </a>
68         </div>
69         <div class="search-box hidden-xs hidden-sm pull-left ml-1">
70           <?php get_search_form(); ?>
71         </div>
72         <div class="submit-btn hidden-xs hidden-sm pull-left ml-1">
73           <a href="<?php echo get_page_link($xpanel['submit-li">
74         </div>
75         <div class="user-info pull-right mr-10">
76           <?php
             if ( is_user_logged_in() ) {
               <?php echo esc_html( get_logged_in_user() );
             }
           </div>
6
```



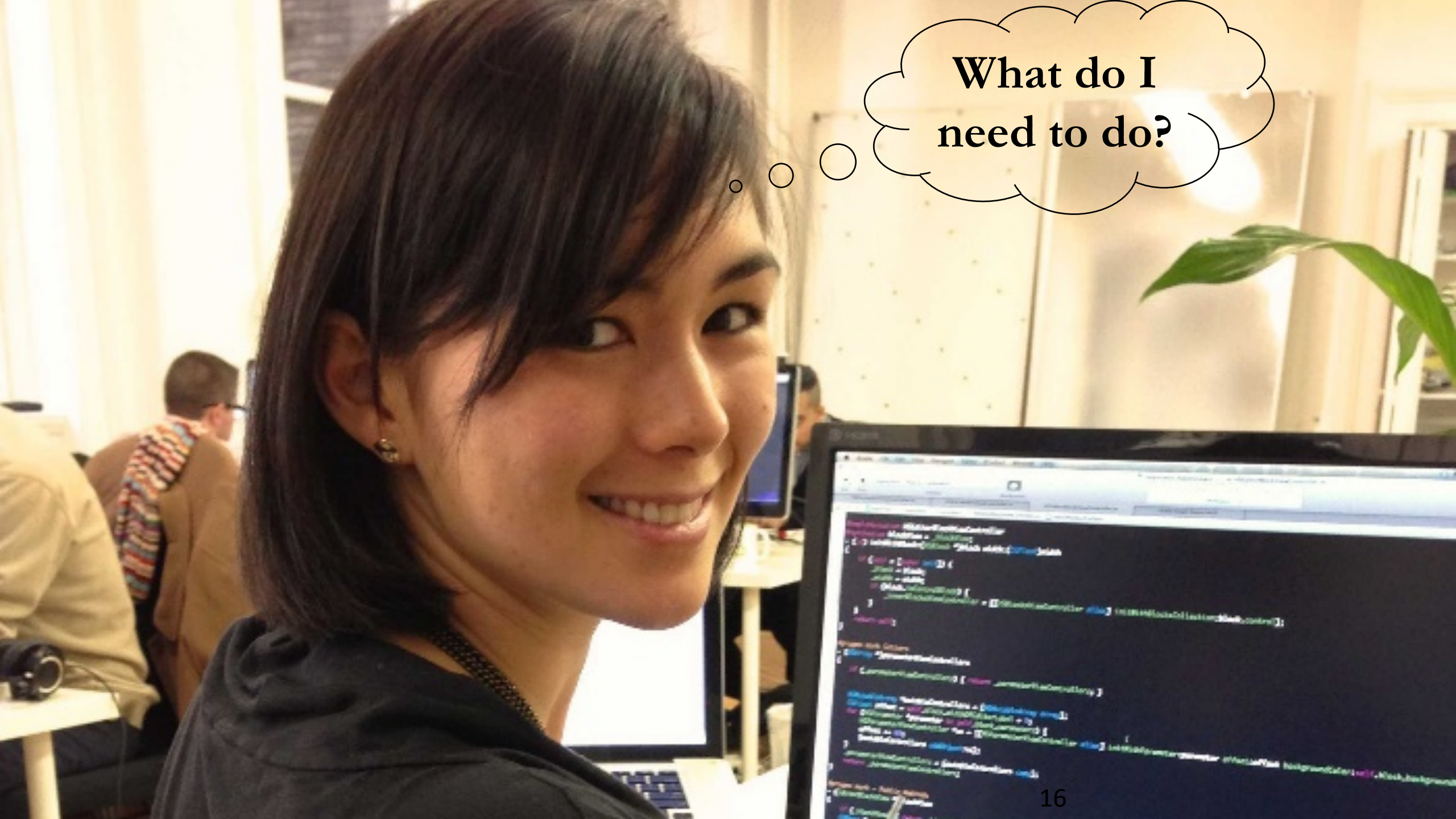
Code Review Goals

- Team building
 - Better shared understanding
 - Team cohesion
 - Peer impression
- Code Quality
 - Find/fix defects early
 - Identify common problems
 - Different perspectives
 - Consistency in code/design
 - More maintainable code
- Personal
 - Learning



Goal is for peace and harmony
in the team, not antagonism.

Code Review Practices



**What do I
need to do?**

For The Developer

- Realize that the goal of code review is to improve the overall code, not to evaluate the quality or worth of the developer
- Remove the fear of making too many mistakes and create an atmosphere where admitting and fixing is OK
- You are not your code
- Be humble
 - You will make mistakes, we all do
 - Someone else will always know more, it's ok, learn from them
 - People bring different perspectives, that's a good thing
- Fight for what you believe, but gracefully accept defeat

What am I
supposed to do?

...



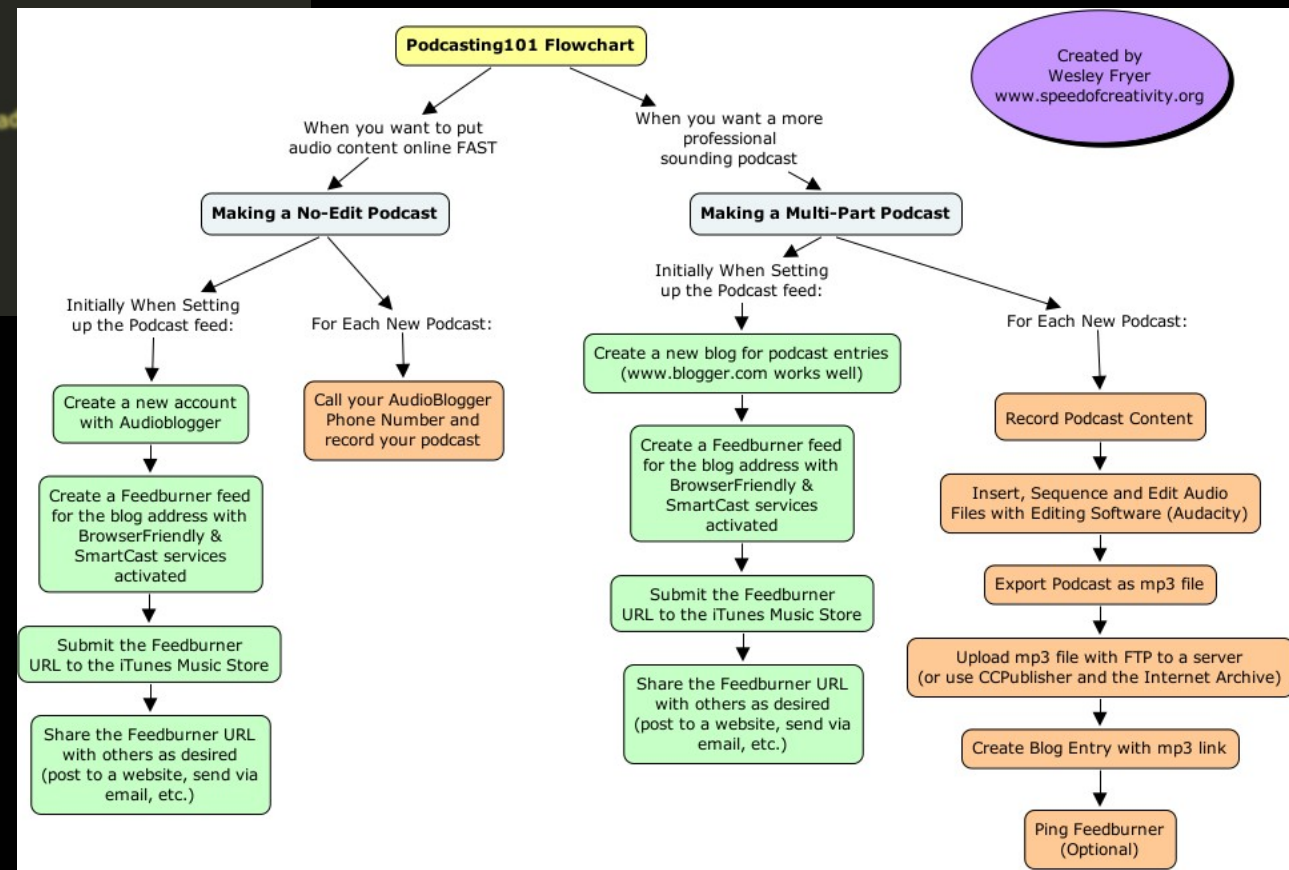
For The Reviewer

- Focus on the code not the author
 - Use “I” statements rather than “you” statements
 - Criticize the author’s behavior, not their attributes
 - Talk about the code, not the coder
- Ask questions rather than make statements – avoid “why” questions
- Accept that there are different solutions
- Choose carefully which battles to fight
- Remember to praise good code
- Take your time and do it well

Code Review Techniques

Code

Algorithms



What to Examine

- Examine the code
 - Is the code readable to a human?
 - Are variables and method names clear?
 - Is there sufficient documentation for someone to come back 6 months later (or someone new) to understand what the code is doing?
- Examine the algorithms in detail
 - Are there any hidden assumptions, not specified, that could cause problems?
 - Are there edge cases that may not work?
 - What happens with bad or missing data?
 - Does the algorithm do what it is supposed to? – Use stepwise abstraction

A close-up, slightly blurred photograph of a person's hand holding a blue pen, poised to write on a document. The hand is wearing a grey, textured sweater. The desk is made of light-colored wood. In the background, there is a white ceramic cup of coffee on a brown coaster, and a spiral-bound notebook lies flat. The overall atmosphere is calm and focused, typical of a workspace.

Code Review Comment Exercise

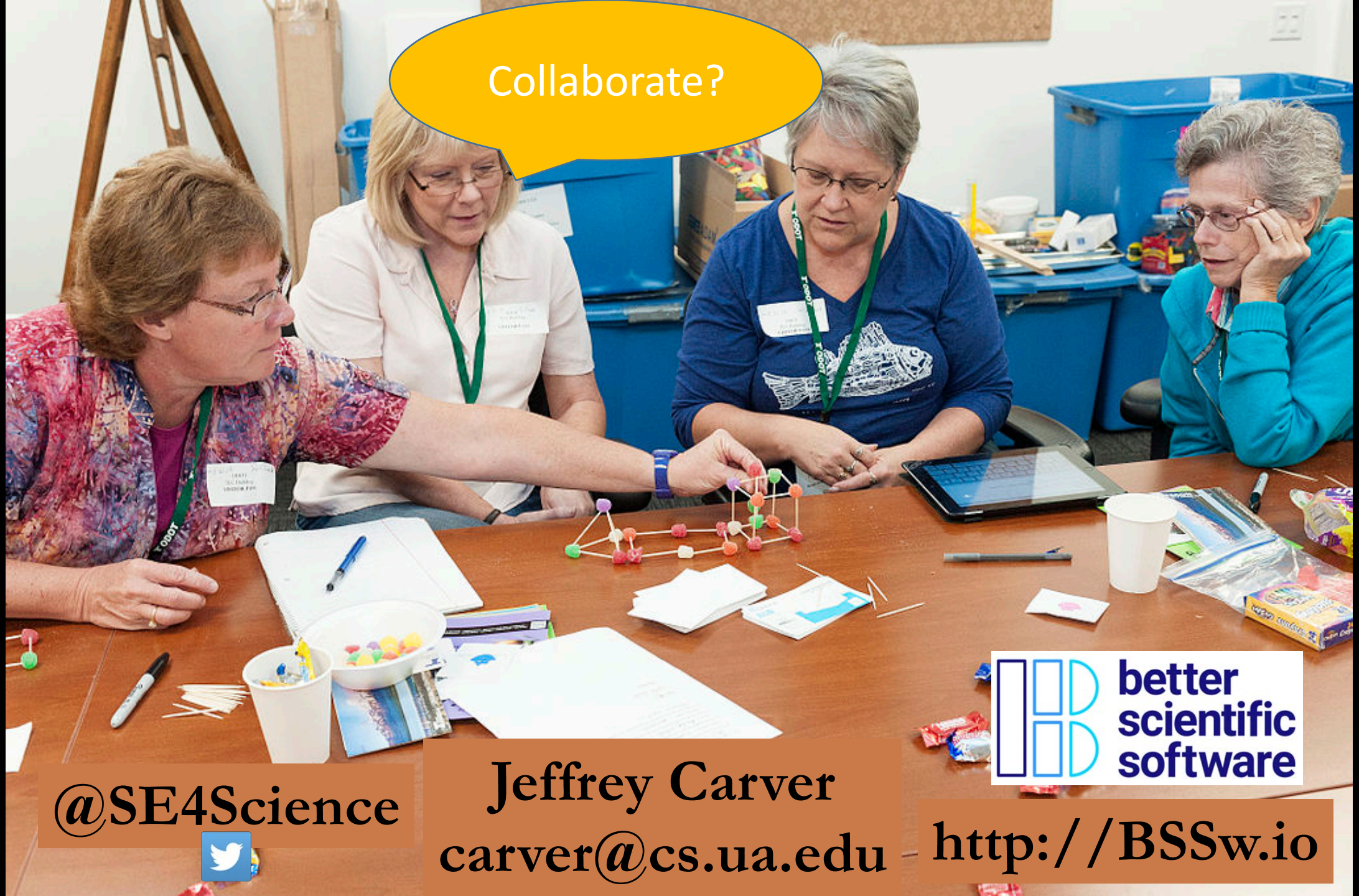
Research Code Review?



Research Code Review

- Cultural difference between scientific community and software engineering community
- Correct results are unknown in many cases
- Testing is extensively complex in scientific software
- Common testing approaches may not fit
- May be better to review the scientific algorithm than to extensively test code
- Lack of proper testing knowledge
- Test to check the science, not the software
- Tend to test when development is about to finish

Collaborate?



@SE4Science



Jeffrey Carver
carver@cs.ua.edu

<http://BSSw.io>



References for further reading

- *Code Complete*, by Steve McConnell
- <https://www.codeproject.com/articles/524235/codeplus-reviewplusguidelines>
- <https://blog.philippbauer.de/code-review-guidelines>
- <https://github.com/joho/awesome-code-review>
- <https://www.planetgeek.ch/wp-content/uploads/2013/06/Clean-Code-V2.1.pdf>

Photo Credits

- <http://incolors.club/collectionfdwn-female-computer-programmer.htm>
- <http://tech.trivago.com/img/posts/code-review/code-review-3.jpg>
- <http://www.protectitip.com/wp-content/uploads/2014/11/Software-Code.jpg>
- http://www.computerhistory.org/atchm/wp-content/uploads/2013/11/marked_up_listing-542x404.jpg
- <https://static1.squarespace.com/static/53798babe4b0fca9449cf693/t/53f78774e4b0ce4d05e4152f/1408730997720/>
- <https://residentialwastesystems.com/wp-content/uploads/2016/10/dumpsters-trumbull-ct.jpg>
- <http://www.hipaasecurennow.com/index.php/beckers-hipaa-compliance-8-best-practices/>
- [https://commons.wikimedia.org/wiki/File:Collaboration_\(9601759166\).jpg#metadata](https://commons.wikimedia.org/wiki/File:Collaboration_(9601759166).jpg#metadata)
- <http://entertainment.time.com/2012/05/09/confessions-of-another-book-reviewer/>
- Photo by [Shubham Sharan](#) on [Unsplash](#)
- Photo by [Green Chameleon](#) on [Unsplash](#)