Code Review

CS580 Advanced Software Engineering
http://cs580.yusun.io
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What is Code Review?

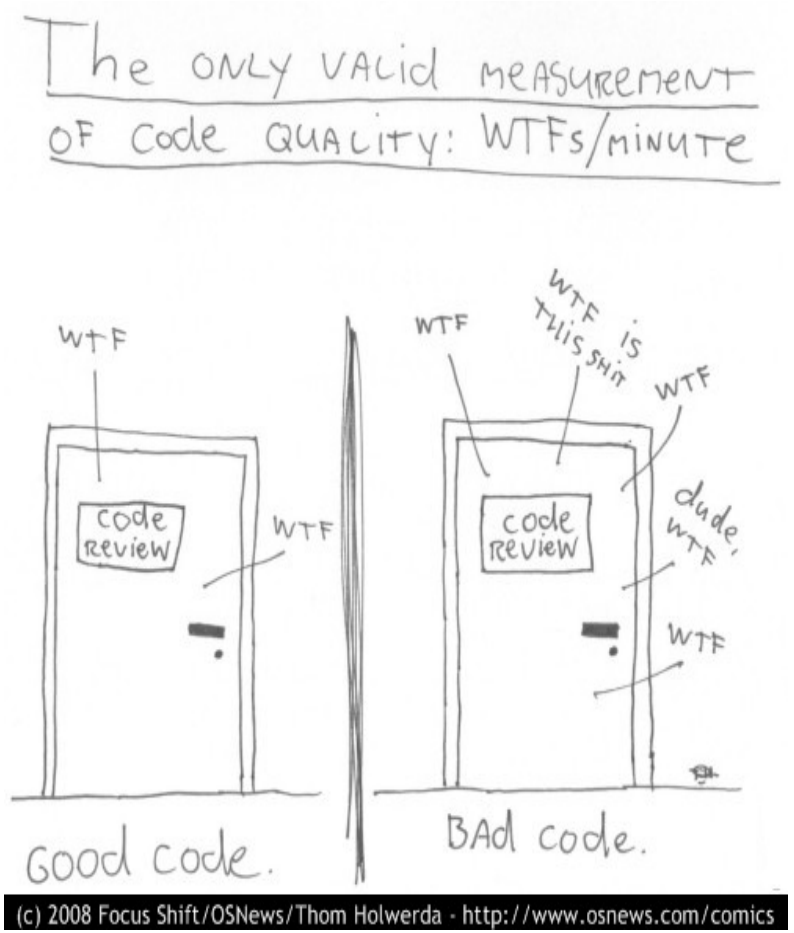
Code Review
is the systematic examination by one's peers of computer source code intended to find and fix mistakes overlooked in the initial development phase.[1]

- The essence of code review is providing an author timely feedback on his or her changes

[1]Source: http://en.wikipedia.org/wiki/Code_review

Code Review Ensures Code Quality

- Average defect detection rate:
  - 25% for unit testing
  - 35% for functional testing
  - 45% for integration testing
  - 55% for design review
  - 60% for code review



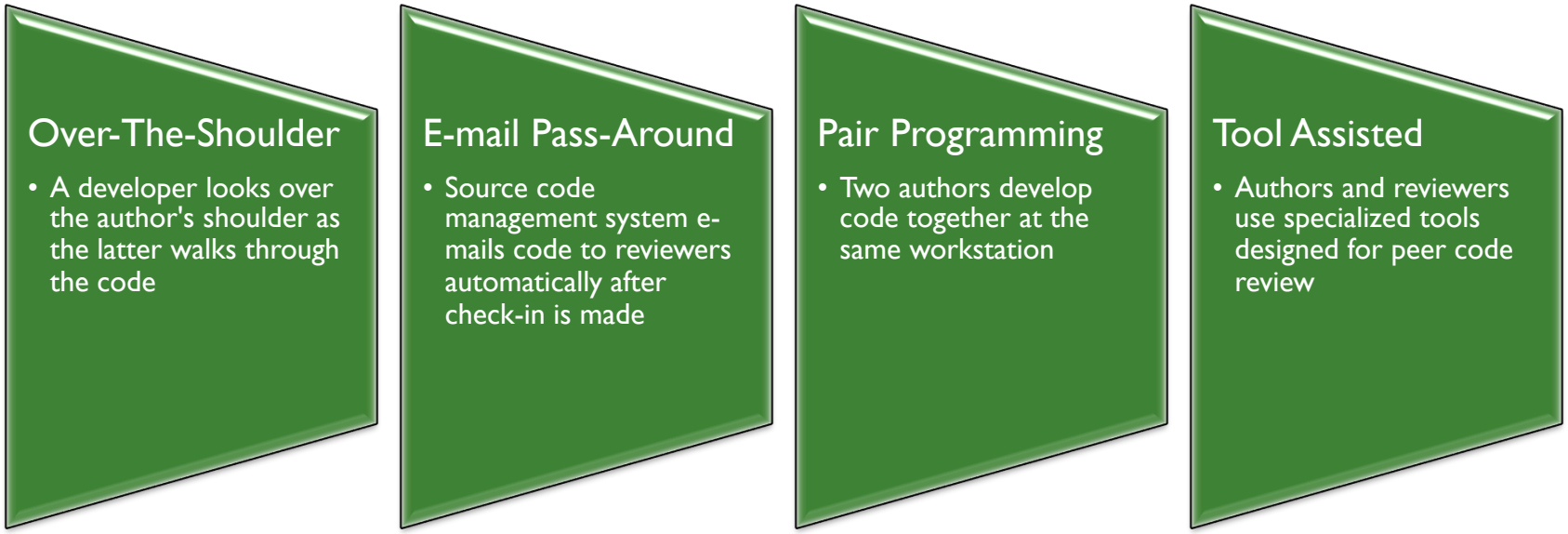
Code Review Ensures Safety

```
public void deposit(Account account, double amount) {
    If (account.number == myAccountNumber) {
        account.balance = account.balance + amount * 100;
    } else {
        account.balance = account.balance + amount;
    }
    ……
}
```

Code Review Improves Coding Skills

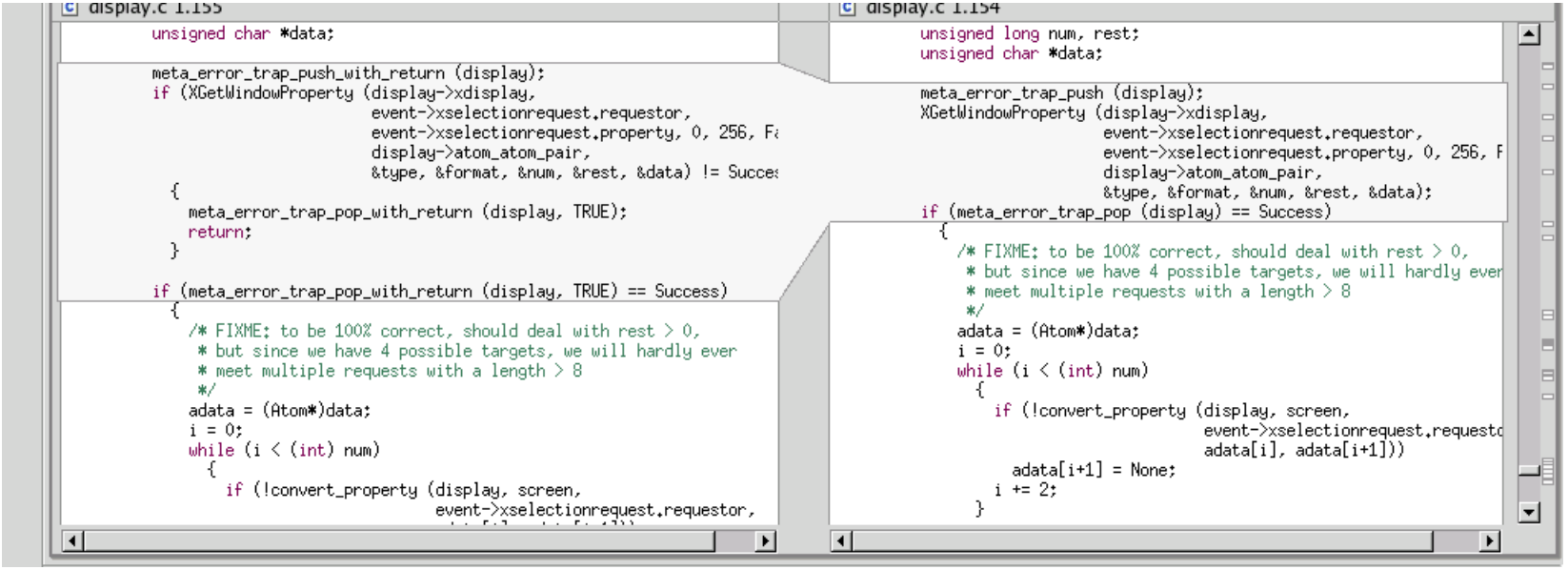
Types of Code Review

- Formal
  - Fagan Inspection (traditional)
- Lightweight



Code Reviews in Industry

- Code reviews are a **very** common industry practice
- Made easier by advanced tools that:
  - integrate with configuration management systems
  - highlight changes (i.e., diff function)
  - allow traversing back into history
    - e.g., Eclipse, SVN tools



Checklist

- Does the code build correctly?
- Does the code execute as expected?
- Is all new code tested? Altered code tests up to date?
- Is the code readable?
- Do you understand the code you are reviewing?
- Has the developer tested the code?
  coding conventions?
  Are all functions, methods and classes documented?
  Are complex algorithms and code optimizations adequately commented?
  Error Handling
  Resource Leaks
  Thread Safeness
  Is the code free of unintended infinite loops?
  Are function parameters explicitly verified in the code?
  Pending/TODO
- assertions
- abnormal terminations
- Database Transactions
- Correct synchronization
- no deadlocks/livelocks
- Bug Fix Side Effects
- All the occurrences of the bug are fixed

Exercise

"Code review" this checkin.
What feedback would you give the author?
What changes would you demand before checkin?

```
public class Account {
   double principal,rate;   int daysActive,accountType;

   public static final int STANDARD=0, BUDGET=1,
   PREMIUM=2, PREMIUM_PLUS=3;
}
...
public static double calculateFee(Account[] accounts)
{
   double totalFee = 0.0;
   Account account;
   for (int i=0;i<accounts.length;i++) {
      account=accounts[i];
      if ( account.accountType == Account.PREMIUM ||
           account.accountType == Account.PREMIUM_PLUS )
         totalFee += .0125 * (            // 1.25% broker's fee
             account.principal * Math.pow(account.rate*
             (account.daysActive/365.25))
             - account.principal);        // interest-principal
   }
   return totalFee;
}
```

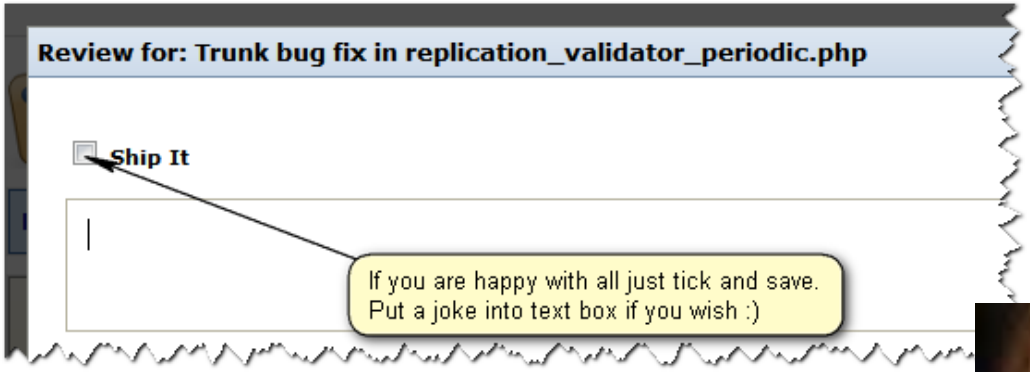
Improved code 1

```
// blah blah blah
public class Account {
   private double principal;
   private double rate;
   private int daysActive;
   private Type type;

   // the various kinds of accounts our bank offers
   public enum Type {STANDARD, BUDGET, PREMIUM, PREMIUM_PLUS}

   // blah blah blah
   public double interest() {
      double years = daysActive / 365.25;
          double compoundInterest = principal * Math.pow(rate *
   years);
      return compoundInterest - principal;
   }

   // blah blah blah
   public boolean isPremium() {
      return accountType == Type.PREMIUM ||
             accountType == Type.PREMIUM_PLUS;
   }
}
```

Improved code 2

```
   // blah blah blah
   public static double calculateFee(Account accounts[]) {
      double totalFee = 0.0;
      for (Account account : accounts) {
         if (account.isPremium()) {
            totalFee += BROKER_FEE_PERCENT * account.interest();
         }
      }
      return totalFee;
   }

   // blah blah blah
   public static final double BROKER_FEE_PERCENT = 0.0125;
}
```

Ship It!


Review for: Trunk bug fix in replication_validator_periodic.php
Ship It
If you are happy with all just tick and save.
Put a joke into text box if you wish :)


10 DAYS OF CODE REVIEW
SHIP IT!!!

Demo

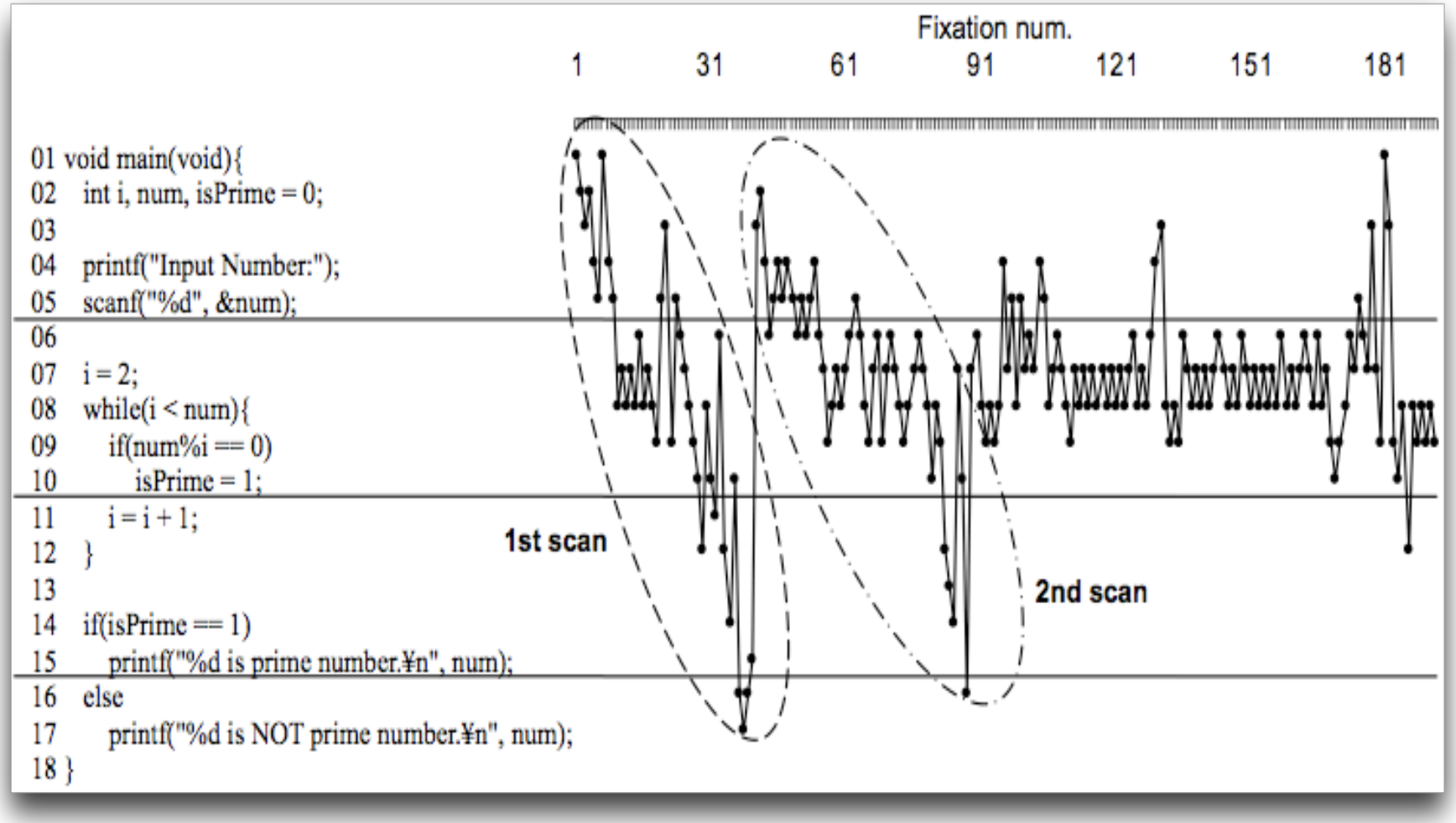
Tips for Effective Code Review

- Psychology – Let's face it, there's a lot of psychology in it, so play nice
- Be professional, nothing is personal
- Strive to understand, not criticize
- Get prepared
  - Understand the technology in use
  - Know the coding conventions
  - Read related code (classes/method being used)
- Read slow
- Short

Eye Tracking

```
01 void main(void) {
02  int i, num, isPrime = 0;
03
04  printf("Input Number:");
05  scanf("%d", &num);
06
07  i = 2;
08  while(i < num) {
09    if (num%i == 0)
10      isPrime = 1;
11    i = i + 1;
12  }
13
14  if (isPrime == 1)
15    printf("%d is prime number.\n", num);
16  else
17    printf("%d is NOT prime number.\n", num);
18 }
```

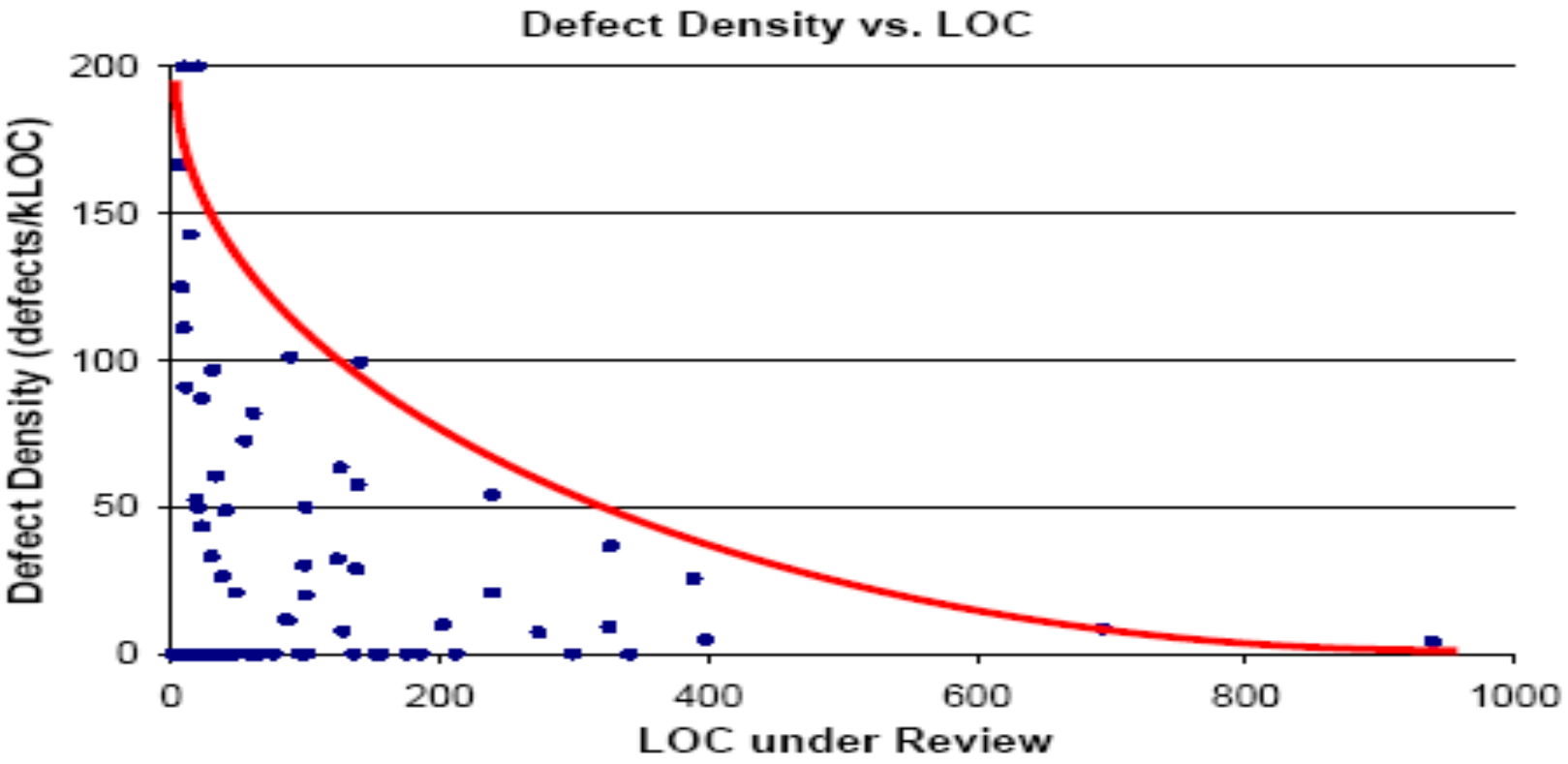
Eye Tracking



Eye Tracking

- Now there's a physiological reason to write short method
- People who spend more time on the first scan find more issues and find them faster

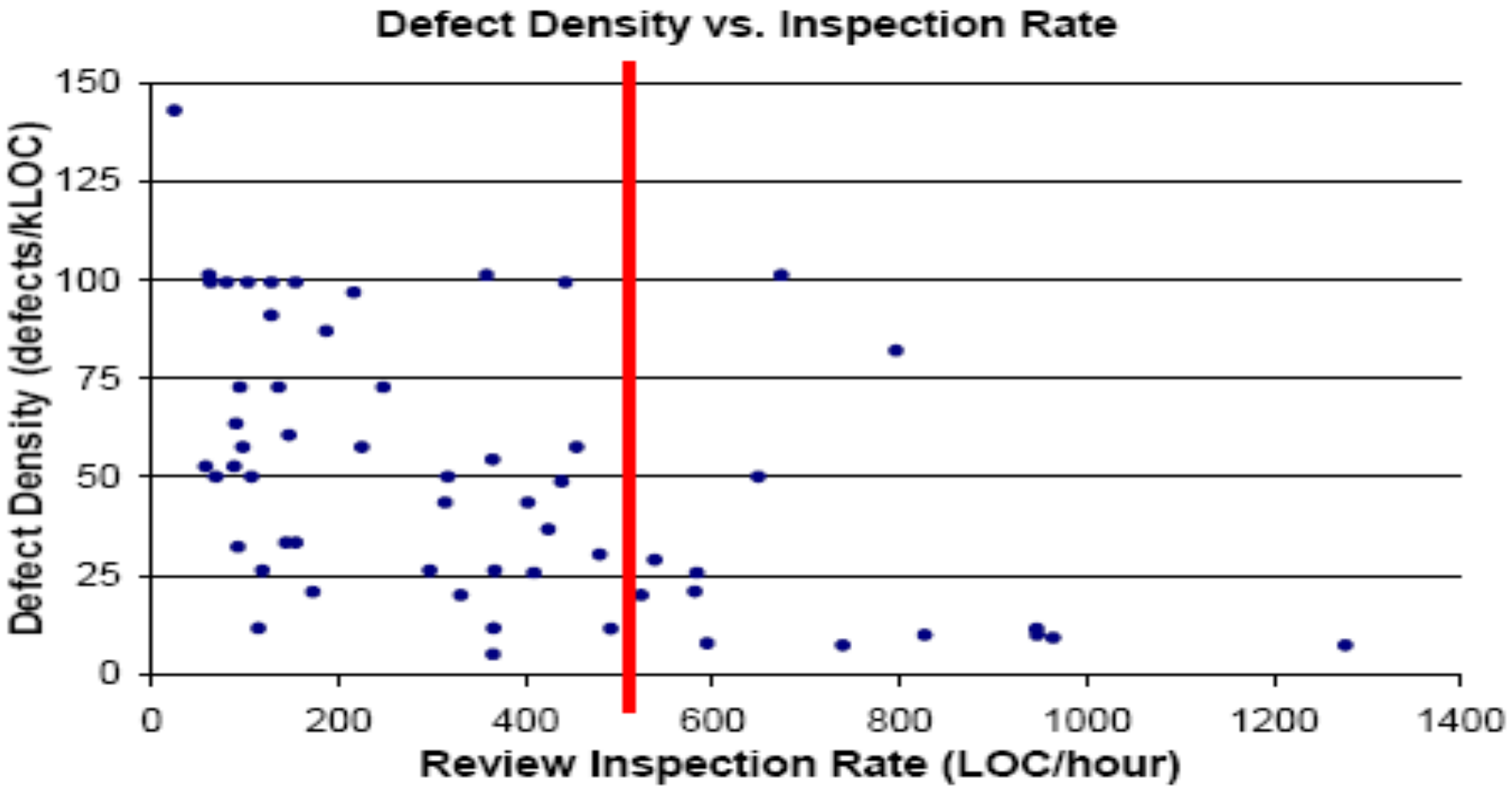
Defect density vs LOC



Conclusion: Don't review too much code at once (<200-400 LOC)

http://smartbear.com/white-paper.php?content=docs/articles/Case-Study.html

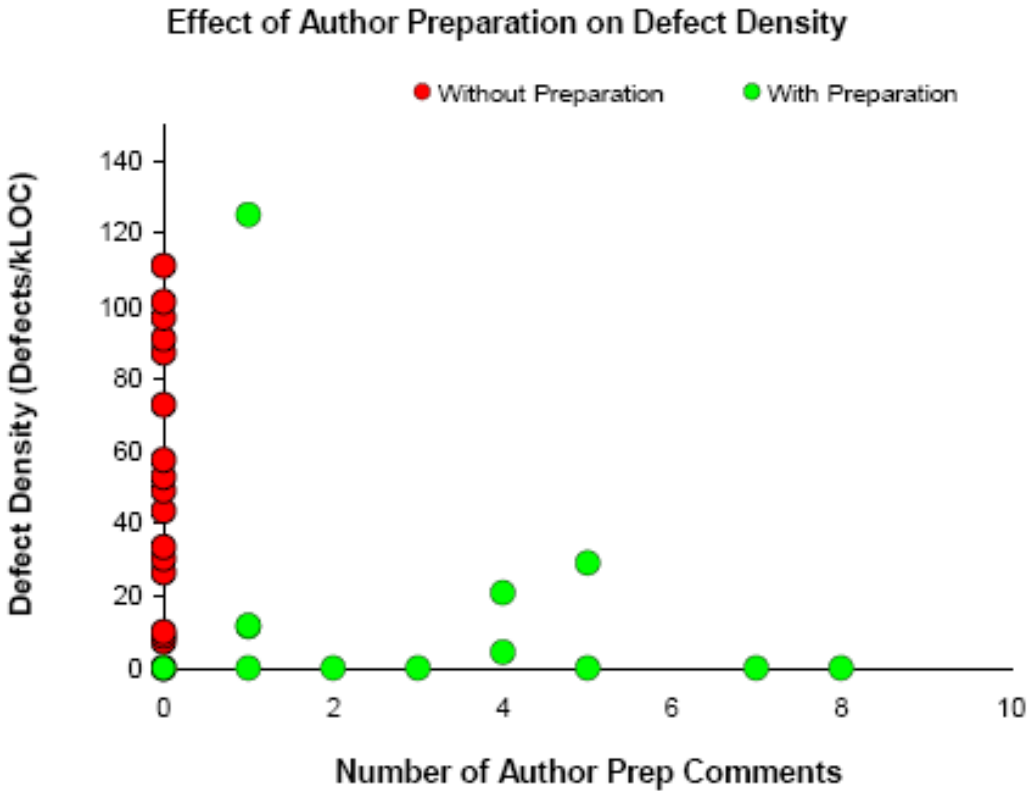
Defect density vs LOC/hour



Conclusion: Take your time (<500 LOC/hour)

http://smartbear.com/white-paper.php?content=docs/articles/Case-Study.html

Author Preparation



Conclusion: Author preparation results in more efficient reviews

http://smartbear.com/white-paper.php?content=docs/articles/Case-Study.html

Code Review Exercise

- http://cr.cs580.yusun.io/
- Register an account if you haven't done it (with email)

- Send a CR request with your A4 code
- Ask 3 of your peers to review it
- cc CS580 group

- You should response to each of the comment
- You should upload new code for the change requests

- You should review others' code carefully
- You decide "Ship It" for others