



EFFECTIVE CODE REVIEW

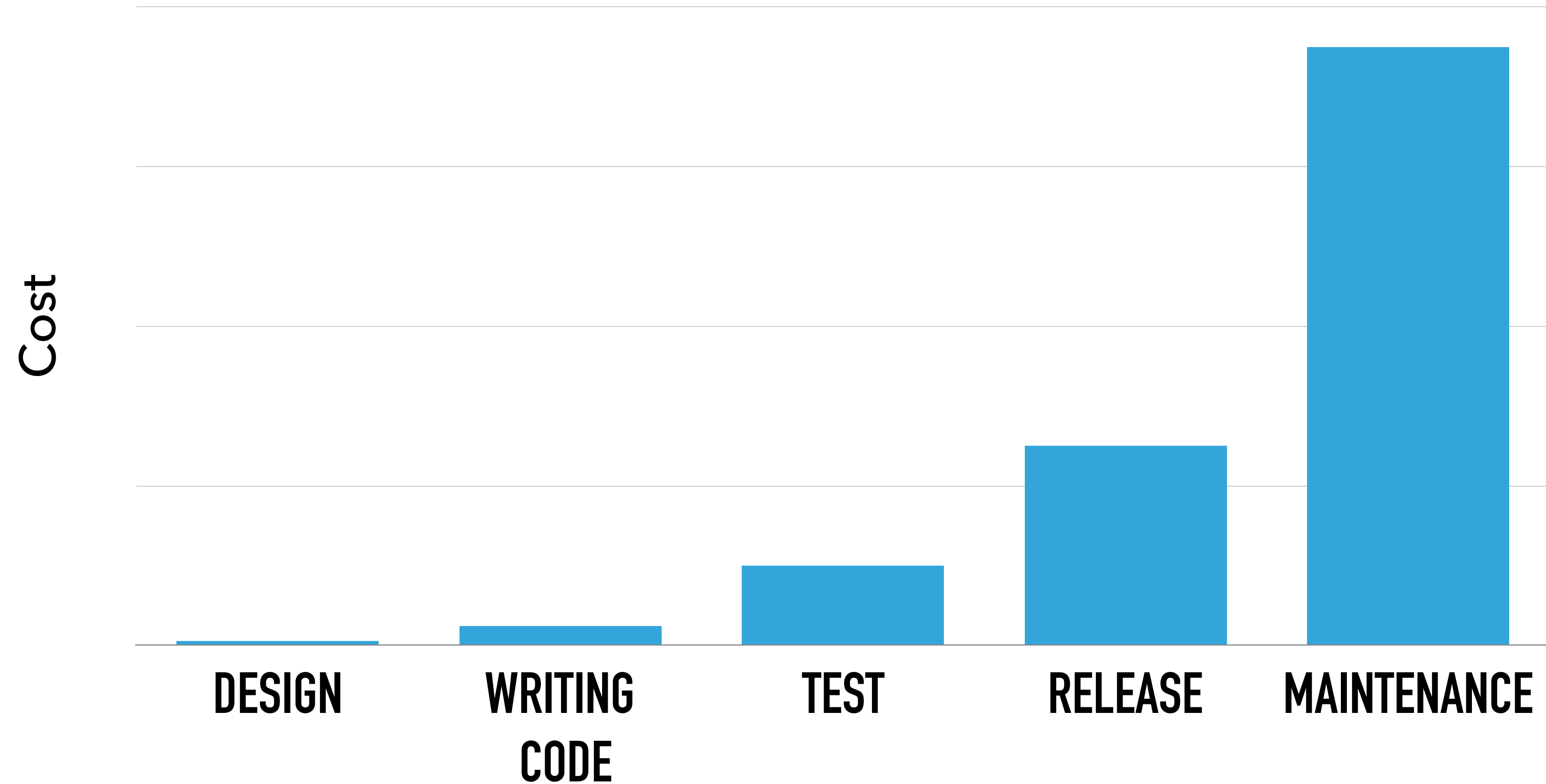
DAVE LIDDAMENT

Lamp Bristol

EFFECTIVE CODE REVIEW REDUCES OVERALL COST OF SOFTWARE DEVELOPMENT

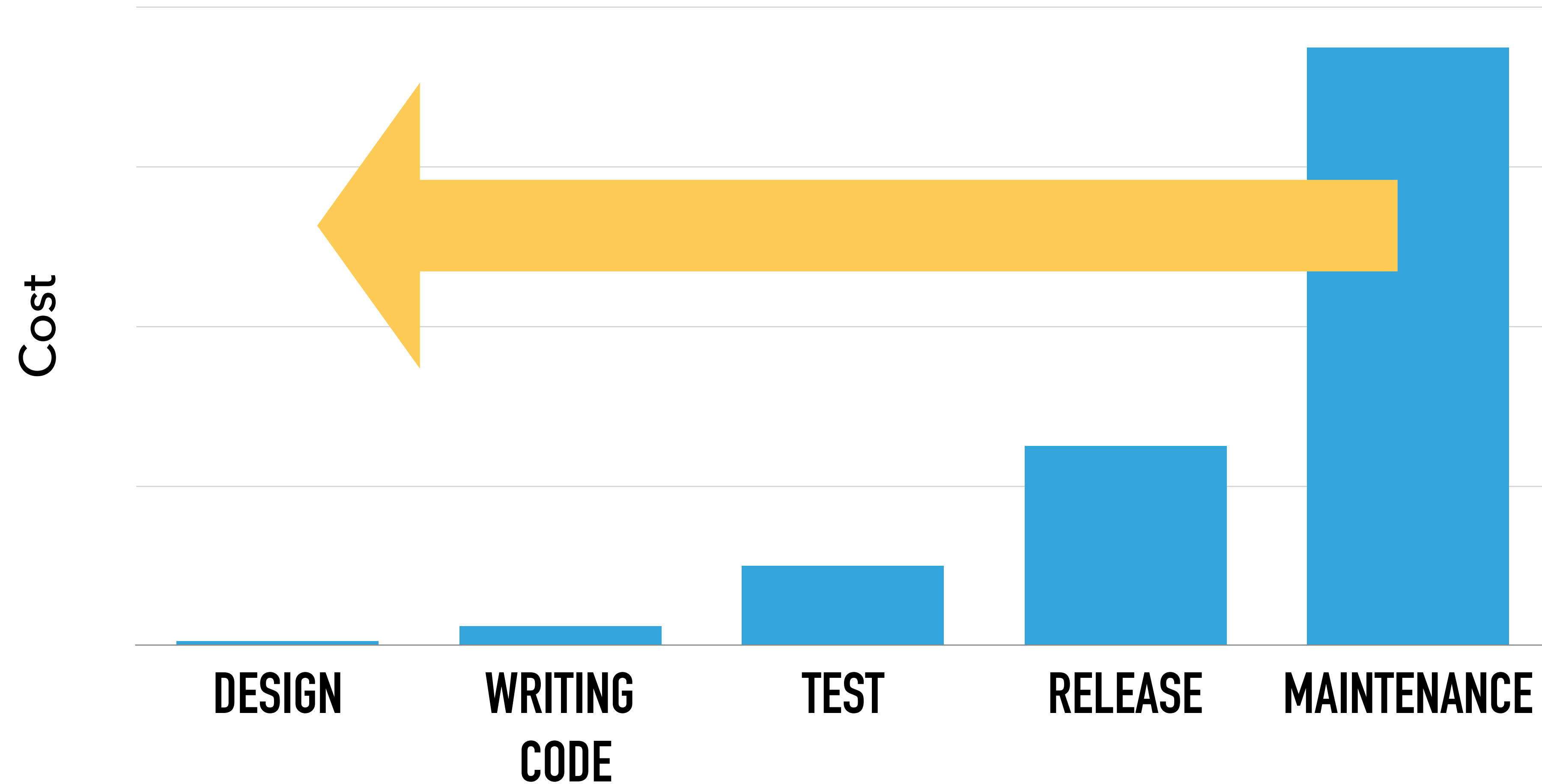
WHY THIS TALK?

REDUCE COST OF BUG – FIND IT SOONER

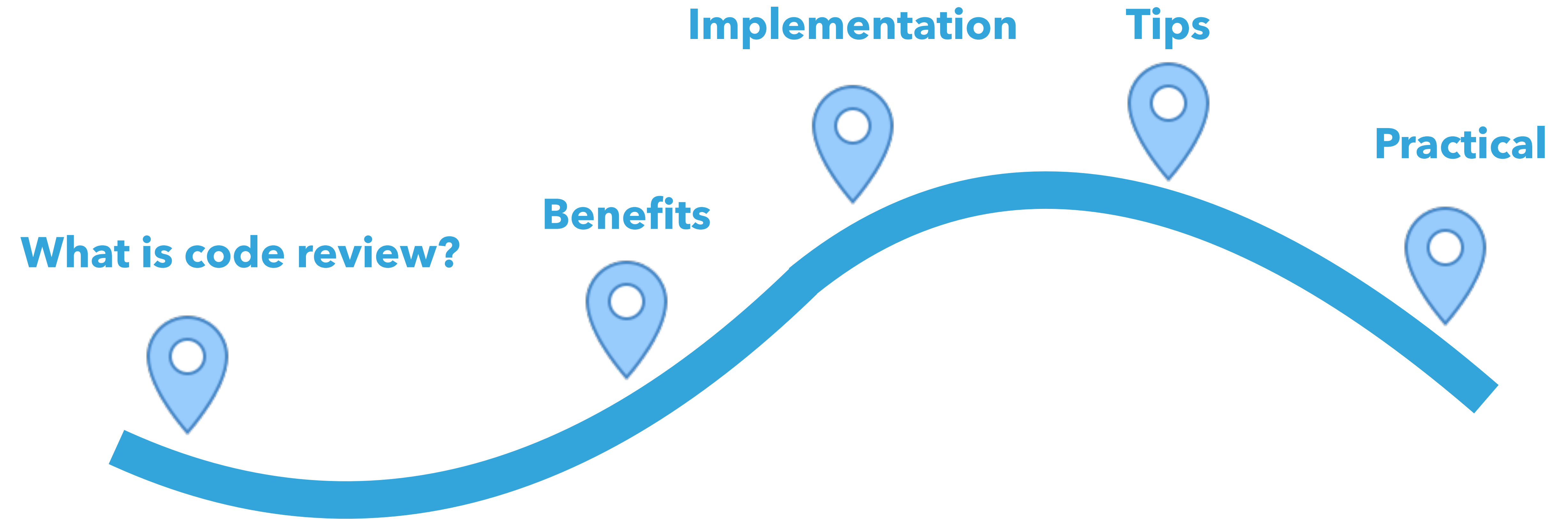


WHY THIS TALK?

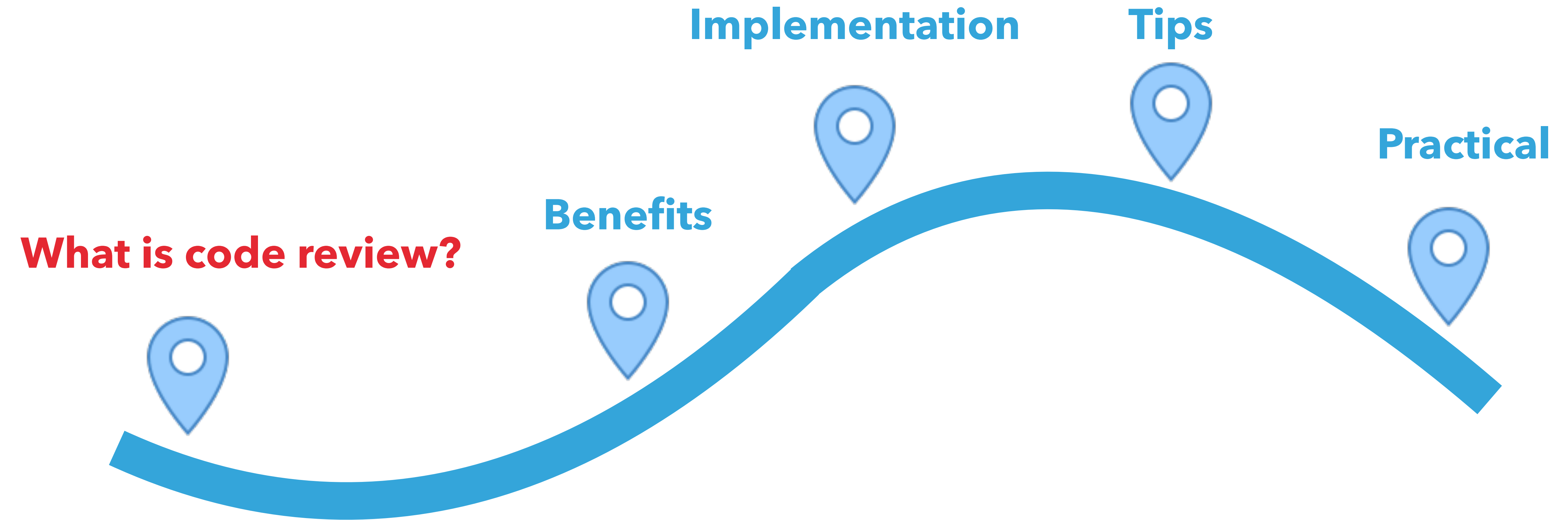
REDUCE COST OF BUG – FIND IT SOONER



AGENDA



AGENDA



**CODE REVIEW IS THE
SYSTEMATIC EXAMINATION OF
SOURCE CODE...**

Wikipedia

**IT IS INTENDED TO FIND MISTAKES
OVERLOOKED IN SOFTWARE
DEVELOPMENT, IMPROVING THE
OVERALL QUALITY OF SOFTWARE.**

Wikipedia

WHAT IS CODE REVIEW?

HOW IS IT DONE?

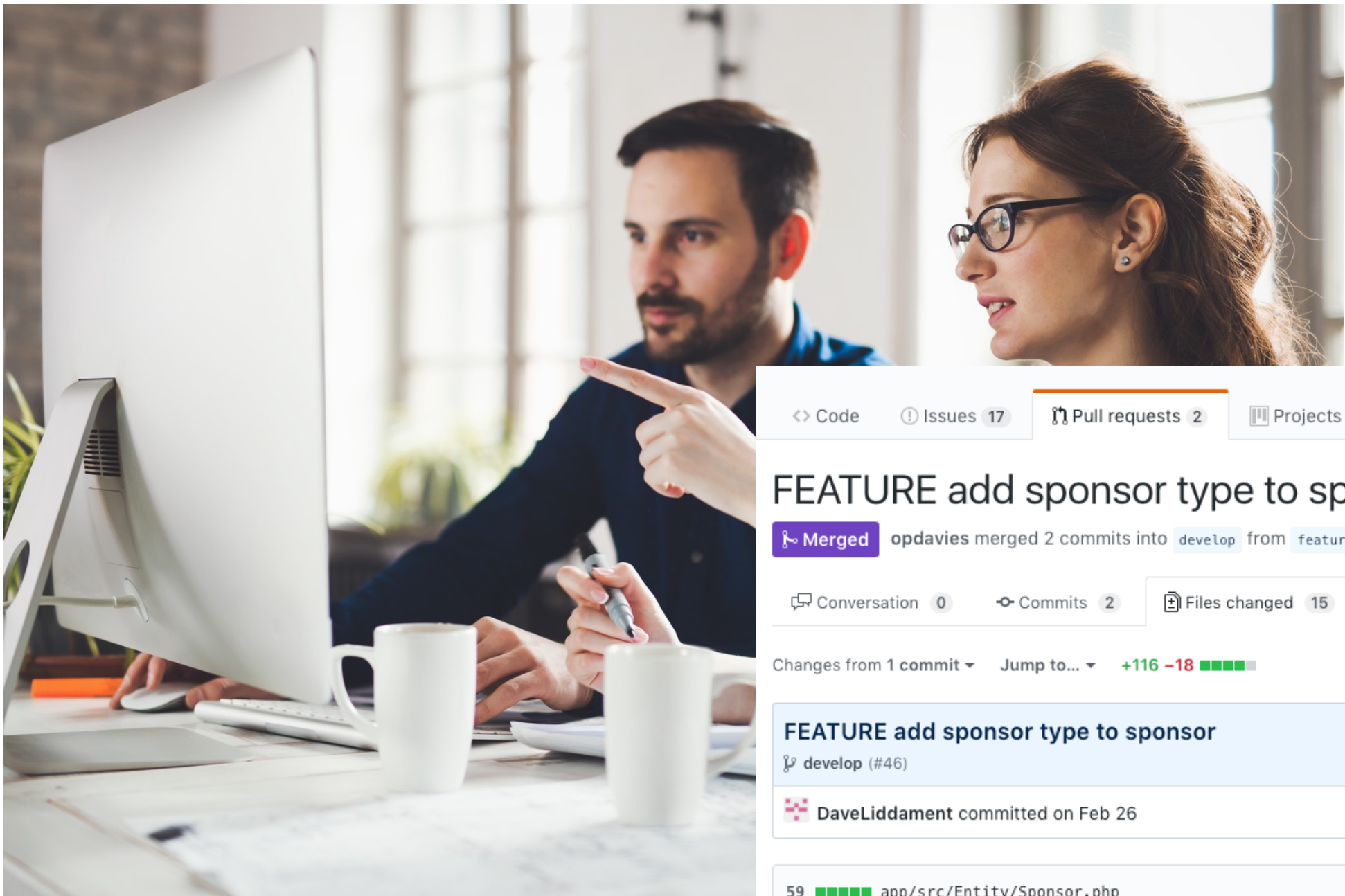
WHAT IS CODE REVIEW?

HOW IS IT DONE?



WHAT IS CODE REVIEW?

HOW IS IT DONE?



<> Code

🔔 Issues 17

🔗 Pull requests 2

📁 Projects 0

📖 Wiki

📊 Insights

⚙️ Settings

FEATURE add sponsor type to sponsor #46

Merged

opdavies merged 2 commits into develop from feature/update-sponsors on Feb 26

💬 Conversation 0

🔗 Commits 2

📄 Files changed 15

Changes from 1 commit ▾ Jump to... ▾ +116 -18 🟢🟢🟢🟢

FEATURE add sponsor type to sponsor

🔗 develop (#46)

DaveLiddament committed on Feb 26

commit 86070f4c08780c8a167bef2b44e09a00609915d6

59 🟢🟢🟢🟢 app/src/Entity/Sponsor.php

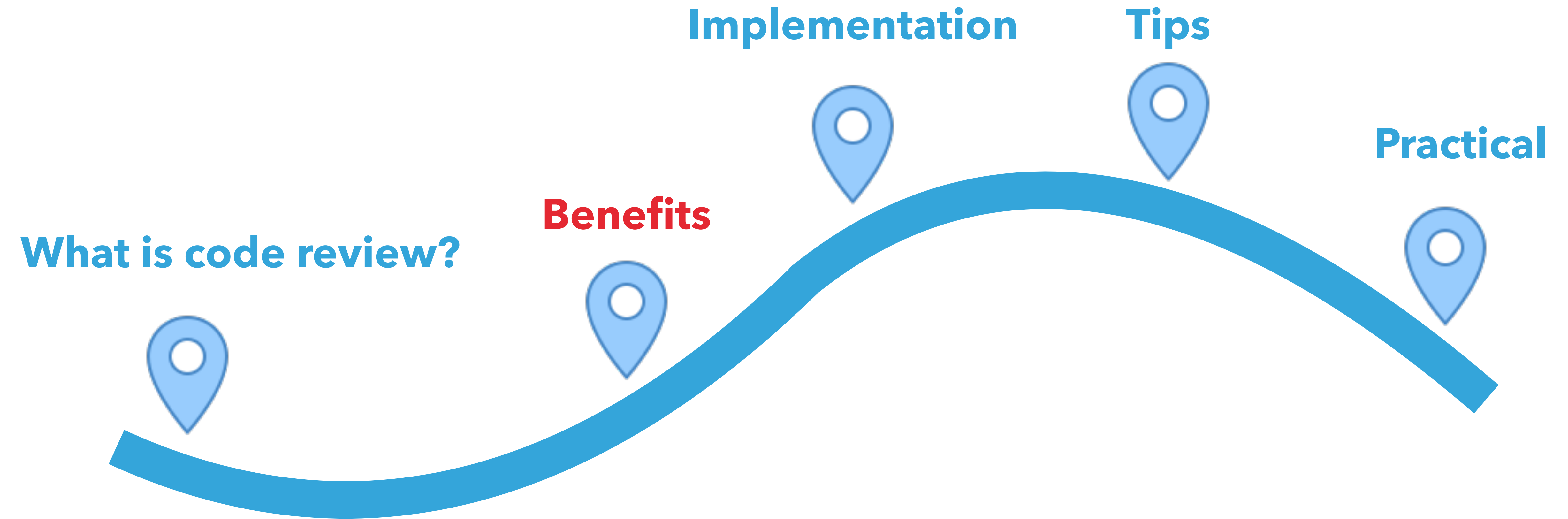
@@ -6,6 +6,16 @@

6
7 class Sponsor
8 {

9 /**
10 * @var string
11 *

6
7 class Sponsor
8 {
9 + /**
10 + * Full sponsor.
11 + */
12 + const SPONSOR_FULL = 'full';
13 +
14 + /**
15 + * Sponsor only covers occasional events.
16 + */
17 + const SPONSOR_EVENT = 'event';
18 +
19 /**
20 * @var string
21 *

AGENDA



CODE REVIEW BENEFITS 1/5

WHAT ARE DEFECTS?

WHAT ARE DEFECTS?

Bugs

WHAT ARE DEFECTS?

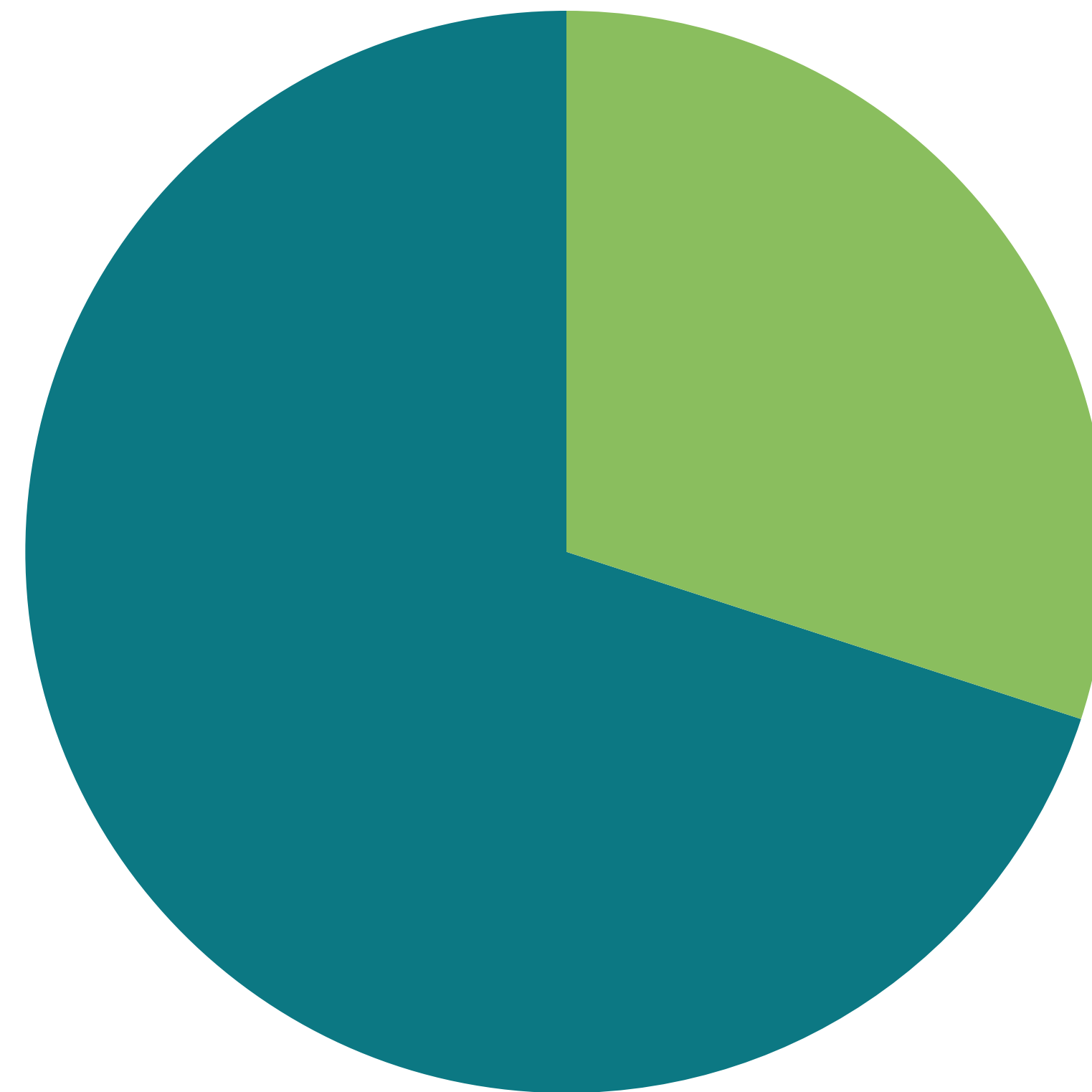
Bugs

Evolvability

AN EVOLVABILITY DEFECT IS...

Code that makes code base less compliant with standards, more error prone, or more difficult to modify, extend or understand.

WHAT ARE DEFECTS?



Bugs

Evolvability

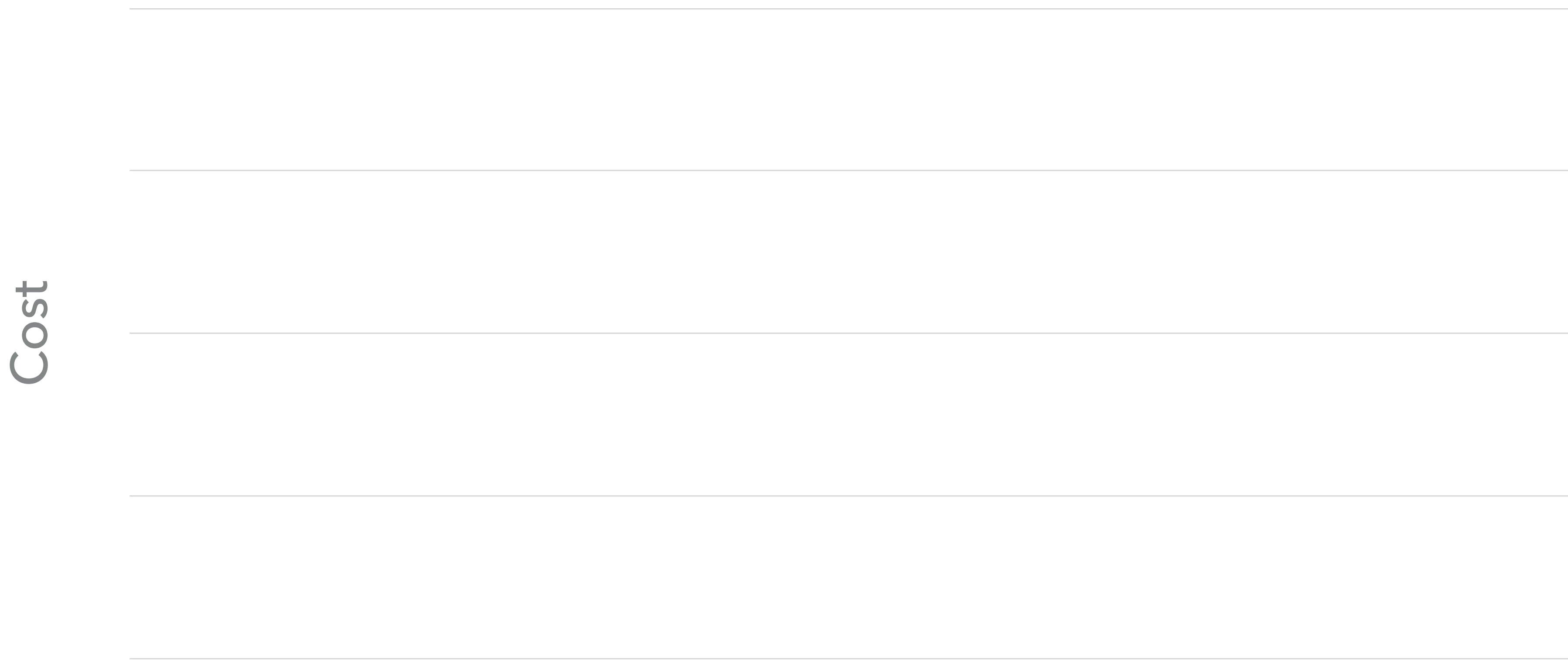
[1, 2]

EVOLVABILITY IS IMPORTANT

- ▶ Low evolvability costs money:
 - ▶ New features took 28% longer to implement [3]
 - ▶ Fixing bugs took 36% longer [3]
- ▶ Software structure may account for 25% of total maintenance costs [4]

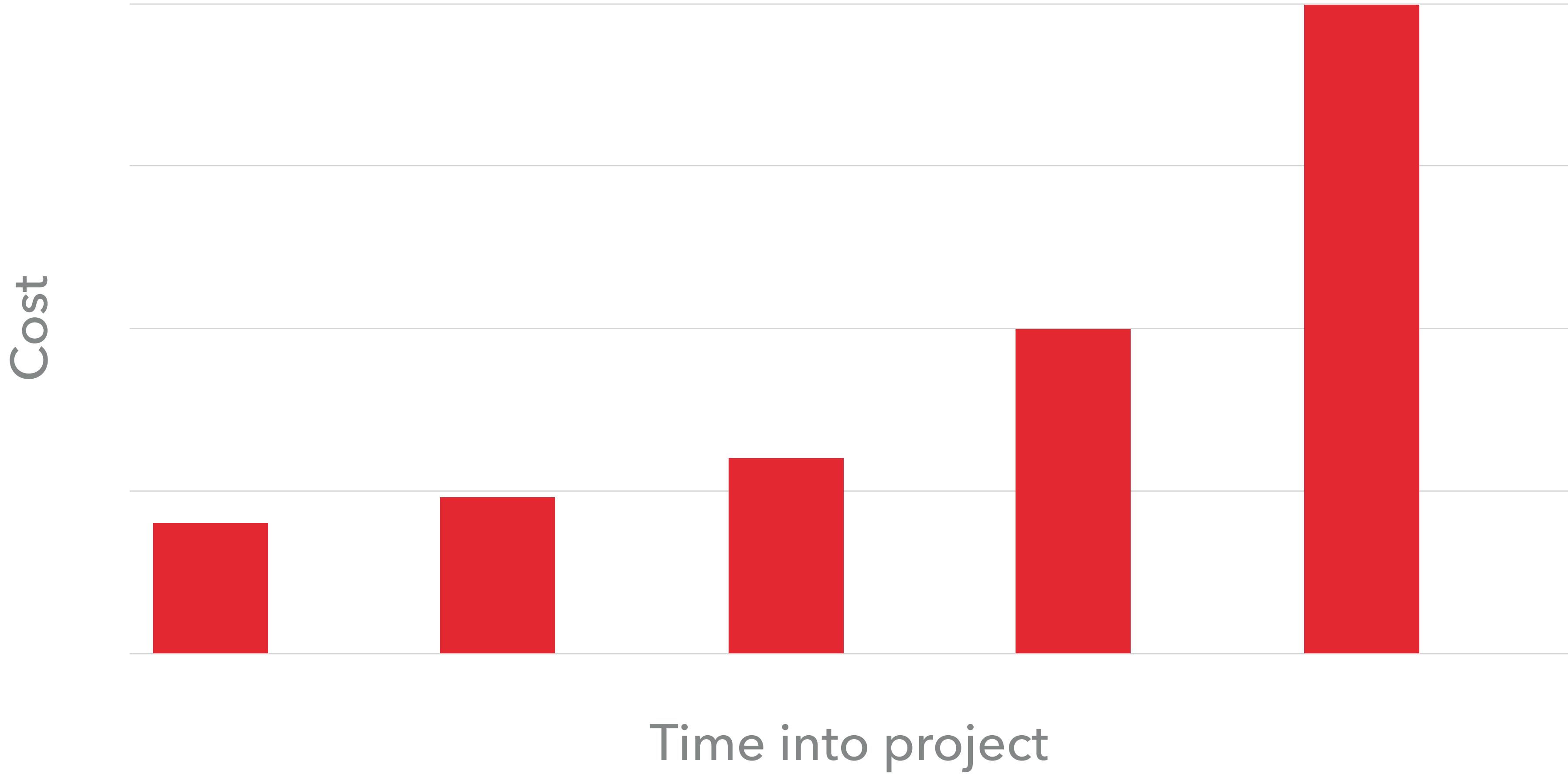
COST TO DEVELOP SIMILAR SIZED FEATURE OVER TIME

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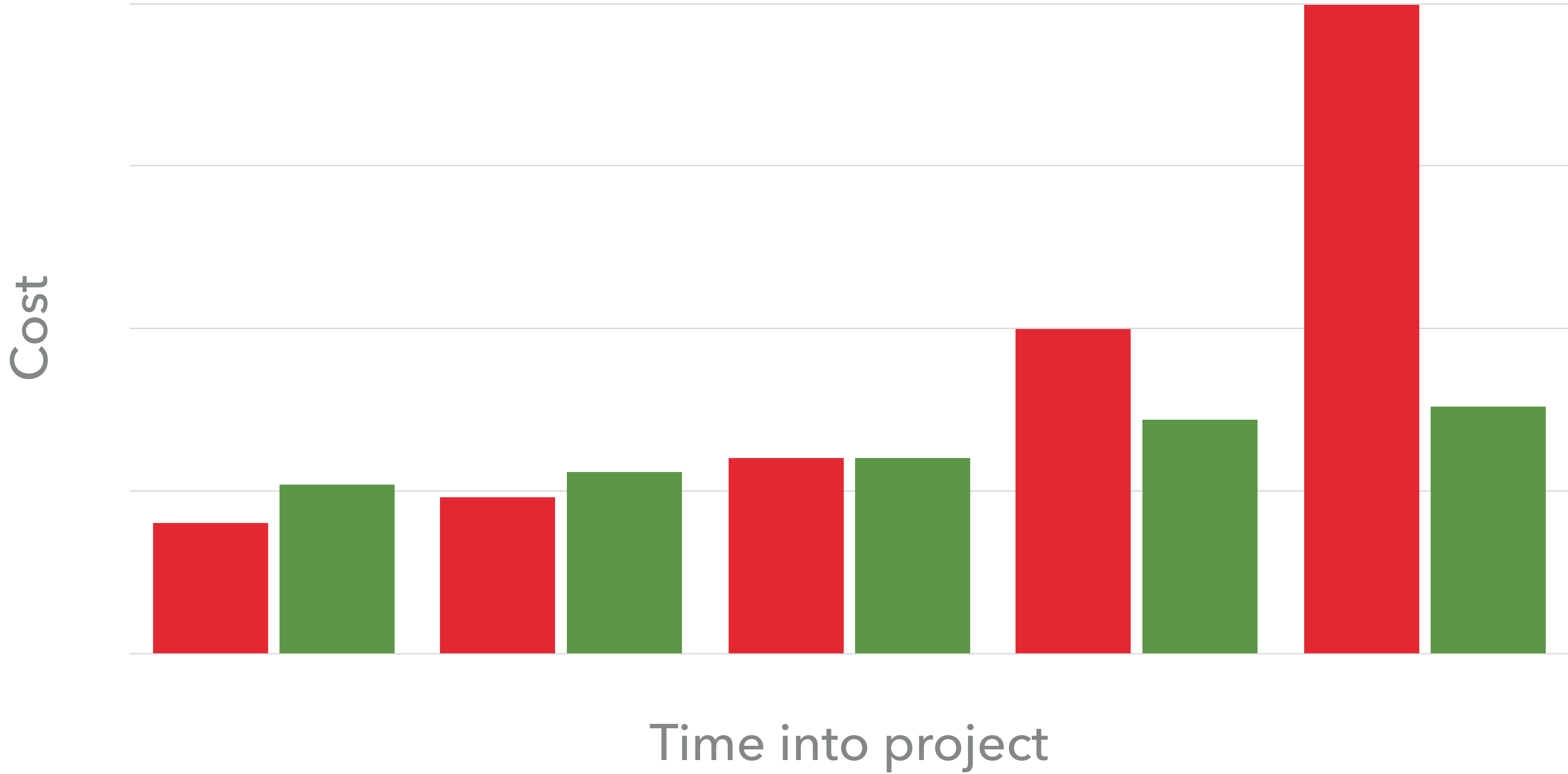


Time into project

COST TO DEVELOP SIMILAR SIZED FEATURE OVER TIME



COST TO DEVELOP SIMILAR SIZED FEATURE OVER TIME



TAKE AWAY

- ▶ The majority of code review comments will be evolvability defects.
 - ▶ OK not to find lots of “bugs”
- ▶ Most comments will be code improvements.
 - ▶ Reduces evolvability defects. Lower overall cost.
 - ▶ Studies back this up.
- ▶ Remember to sell the right metric to management.

SECURITY REVIEW

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- ▶ Writing sensitive data to logs (e.g. password)

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- ▶ Files that shouldn't be there? (e.g. malware)

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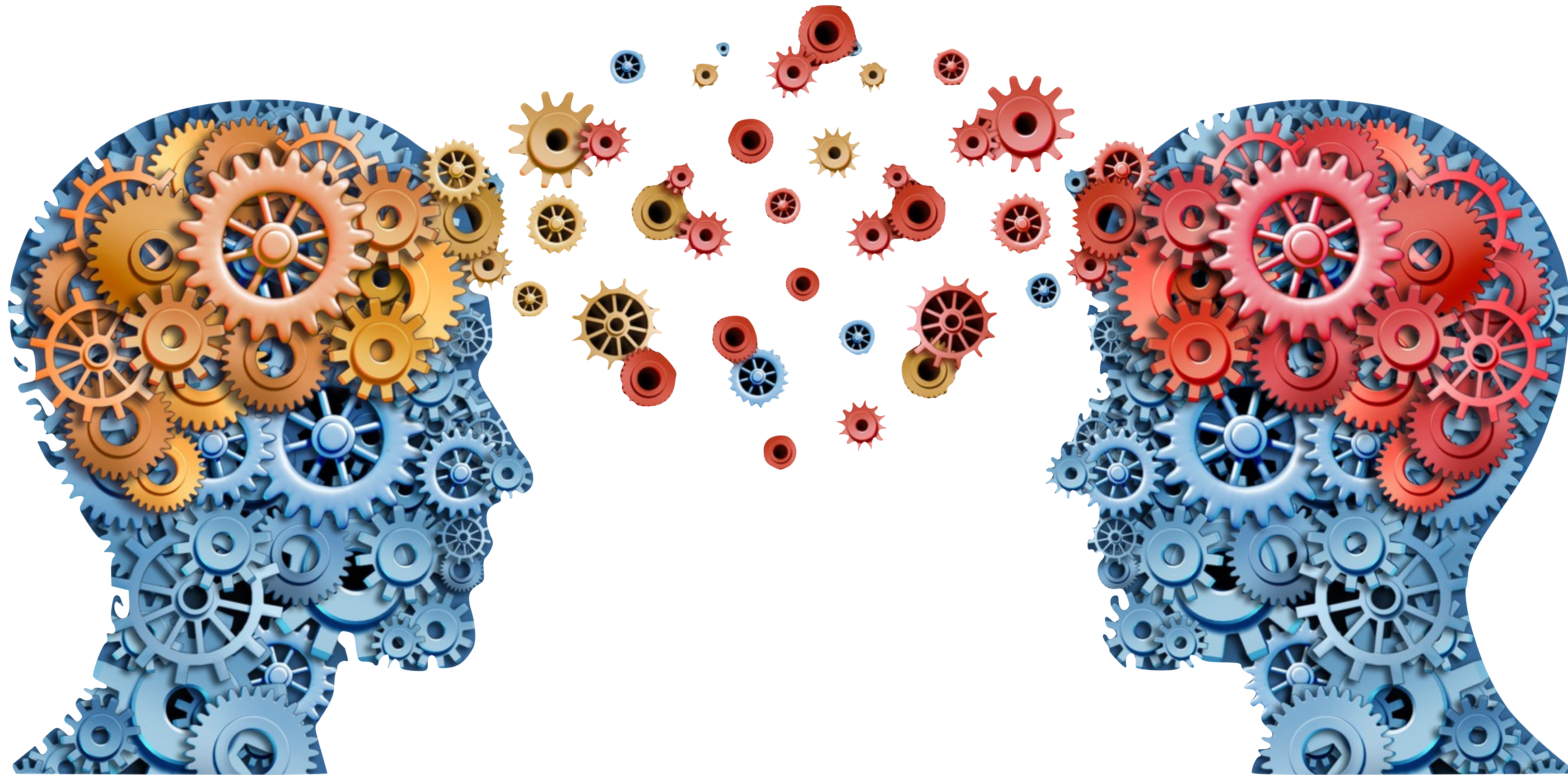
SECURITY REVIEW

- ▶ Writing sensitive data to logs (e.g. password)
- ▶ Files that shouldn't be there? (e.g. malware)
- ▶ OWASP top 10
 - ▶ OWASP top 10 cheat sheet
- ▶ Not / weakly hashing passwords

SECURITY REVIEW

- ▶ Writing sensitive data to logs (e.g. password)
- ▶ Files that shouldn't be there? (e.g. malware)
- ▶ OWASP top 10
 - ▶ OWASP top 10 cheat sheet
- ▶ Not / weakly hashing passwords
- ▶ Rolled your own authentication / hashing / encryption algorithms

SPREAD THE KNOWLEDGE



NO MORE SILOS



NO MORE SILOS



NO MORE SILOS



NO MORE SILOS



NO MORE SILOS



MENTORING



TIL

```
if ($act1 === $act2) {  
    return $scene1 <=> $scene2;  
}  
return $act1 <=> $act2;
```

TIL

```
if ($act1 === $act2) {  
    return $scene1 <=> $scene2;  
}  
return $act1 <=> $act2;
```

```
return [$act1, $scene1] <=> [$act2, $scene2]
```

YOU'RE BEING WATCHED!



YOU'RE BEING WATCHED!



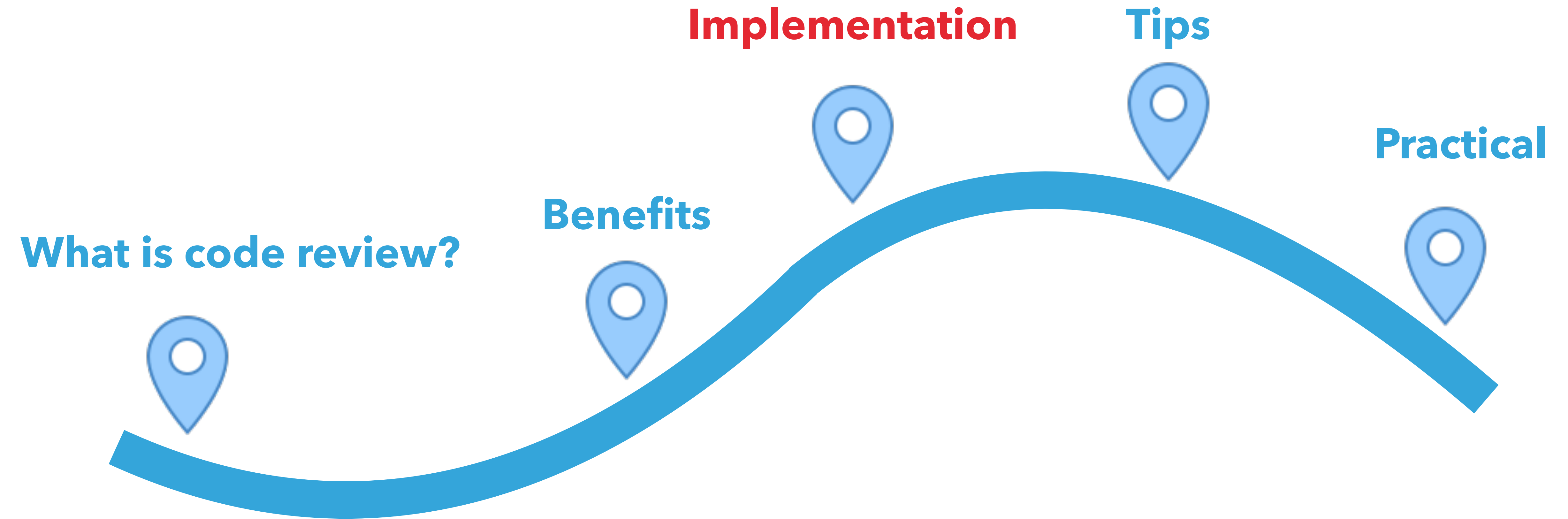
[5]

BENEFITS

- ▶ Reduce defects
 - ▶ Studies that back this up
- ▶ Find security vulnerabilities
- ▶ Spread knowledge
- ▶ Mentoring
- ▶ Peer pressure improves code quality

**EFFECTIVE CODE REVIEW
REDUCES OVERALL COST OF
SOFTWARE DEVELOPMENT**

AGENDA

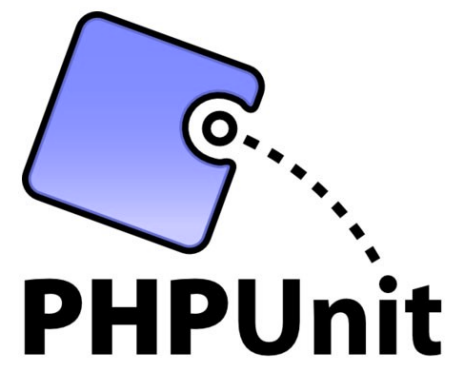


IMPLEMENTATION

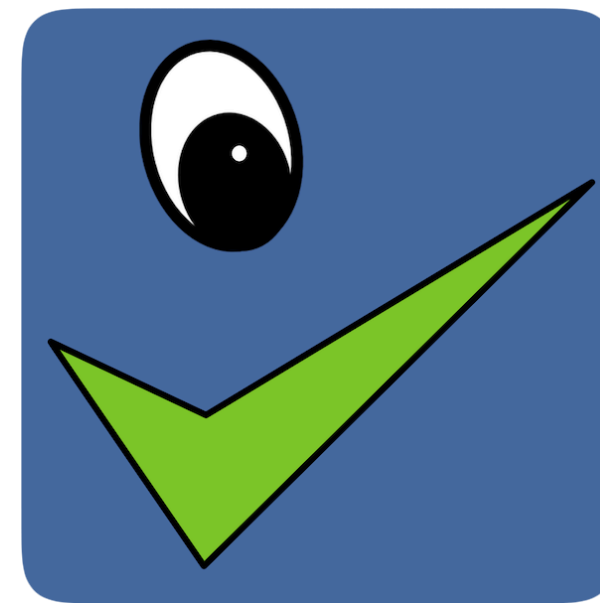
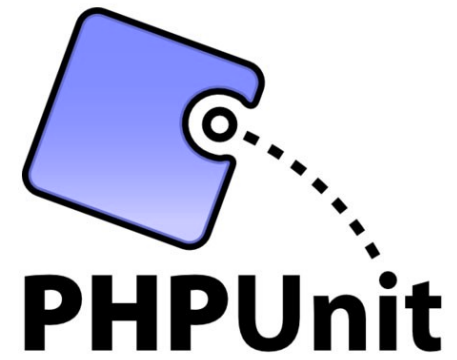
AUTOMATE AS MUCH AS POSSIBLE

IMPLEMENTATION

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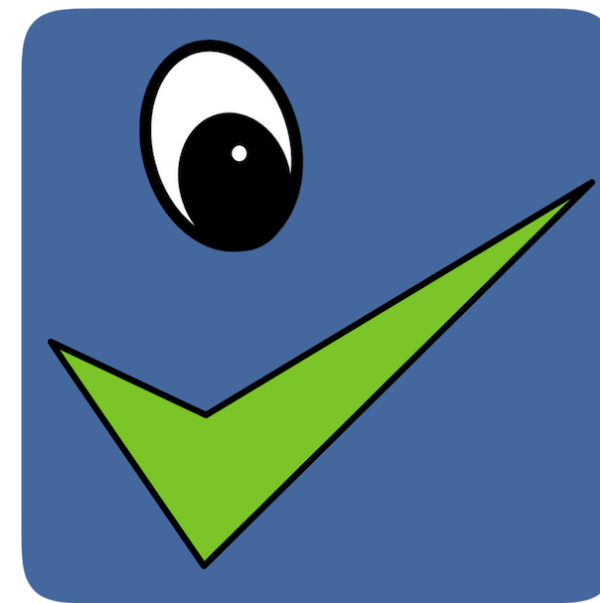
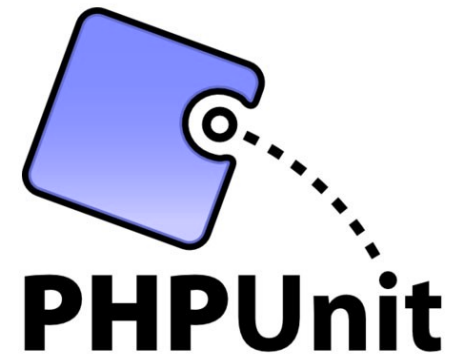


**Check
Style**



Psalm

AUTOMATE AS MUCH AS POSSIBLE

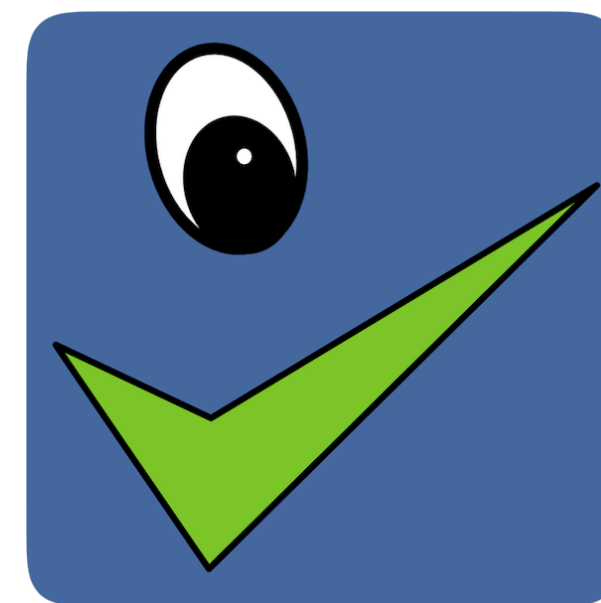
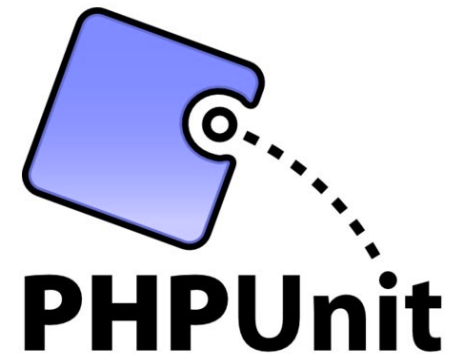


**Check
Style**



Psalm

AUTOMATE AS MUCH AS POSSIBLE



**Check
Style**




Psalm



<https://github.com/DaveLiddament/skeleton-ci-project>

WHAT ARE WE REVIEWING?



DaveLiddament commented on 26 May 2019

Owner + 😊 ...

No description provided.

WHAT ARE WE REVIEWING?



DaveLiddament commented on 30 Dec 2018

Owner + 😊 ...

Previously SARB generated a diff from the baseline commit and the most recent commit. However static analysis might be run on the current state of the code. These 2 might be different.

When running on CI the current state of the code and latest commit will *probably* be the same.

Developing locally this will probably not be the case. Developers will want to make sure no errors have been introduced since the baseline before committing code. To improve DX SARB will look at diff between the baseline commit and HEAD.

It is assumed the process will be something like this:

- developer edits code
- developer runs static analysis tool
- developer runs SARB
- developer removes any issues raised since the baseline
- once all post baseline issues are removed developer commits code

Hence the need for the diff to be taken against current state of code rather than last commit.

ARE THE TESTS TESTING THE RIGHT THING?

Input	Expected Output
my blog	my-blog
hello Dave	hello-Dave

ARE THE TESTS TESTING THE RIGHT THING?

Input	Expected Output
my blog	my-blog
hello Dave	hello-Dave

ARE THE TESTS ADEQUATE?

Input	Expected Output
my blog	my-blog
it's Saturday	its-saturday

ARE THE TESTS ADEQUATE?

Input	Expected Output
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ARE THE TESTS ADEQUATE?

Input	Expected Output
my blog	my-blog
it's Saturday	its-saturday

HOW MANY TESTS DO WE NEED?

```
/**
 * @throws NotFoundException
 */
public function isAllowed(int $userId): bool
{
    .. some implementation ..
}
```

WILL I UNDERSTAND THIS CODE IN 6 MONTHS?

```
$userFields = [  
    'Username',  
    'Email',  
    'FirstName',  
    'LastName',  
    'Phone',  
];  
  
foreach ($userFields as $key) {  
    if ($userDetails->{'get'.$key}()) {  
        $user->{'set'.$key}($userDetails->{'get'.$key}());  
    }  
}
```

WILL I UNDERSTAND THIS CODE IN 6 MONTHS? (2)

```
if ($userDetails->getUsername()) {  
    $user->setUsername($userDetails->getUsername());  
}  
if ($userDetails->getEmail()) {  
    $user->setEmail($userDetails->getEmail());  
}  
if ($userDetails->getFirstName()) {  
    $user->setFirstName($userDetails->getFirstName());  
}  
if ($userDetails->getLastName()) {  
    $user->setLastName($userDetails->getLastName());  
}  
if ($userDetails->getPhone()) {  
    $user->setPhone($userDetails->getPhone());  
}
```


“THE RATIO OF TIME SPENT **READING** VERSUS **WRITING** IS WELL OVER **10 TO 1**. WE ARE CONSTANTLY READING OLD CODE AS PART OF THE EFFORT TO WRITE NEW CODE. . . .
[THEREFORE,] **MAKING IT EASY TO READ MAKES IT EASIER TO WRITE.**”

Robert C. Martin (Clean Code)

ARE THE COMMENTS STILL CORRECT?

```
class Location
{
    /**
     * Returns type (City, town, village)
     */
    public function getUrl(): string
    {
        return $this->url;
    }
}
```

ARE THE COMMENTS STILL CORRECT?

```
class Location
{
```

```
    /**
     * Returns type (City, town, village)
     */
    public function getUrl(): string
    {
        return $this->url;
    }
```

```
}
```

ARE THE COMMENTS USEFUL?

```
/**  
 * @return string url  
 */  
public function getUrl(): string  
{  
    return $this->url;  
}
```


IS A COMMENT MISSING?

```
function compareTeams (Team $a, Team $b) : int  
{ ... }
```

IS A COMMENT MISSING?

```
/**  
 * Used to sort order of teams in a league table.  
 *  
 * Sort order:  
 * - points (3 for win, 1 for draw)  
 * - goal difference  
 * - goals for  
 * - team name  
 */  
function compareTeams (Team $a, Team $b) : int  
{ ... }
```

IS A COMMENT MISSING?

```
/**  
 * Used to sort order of teams in a league table.  
 *  
 * Sort order:  
 * - points (3 for win, 1 for draw)  
 * - goal difference  
 * - goals for  
 * - team name  
 */  
function compareTeams (Team $a, Team $b) : int  
{ ... }
```

`compareTeamsByPoints3ForWin1ForDrawThenGoalDifferenceThenGoalsForThenTeamName`

HOMEWORK

- ▶ Find code >6 months old. Can you understand it?
- ▶ Find "self documenting code" > 6 months old.
 - ▶ Can you understand it?
 - ▶ Can someone else understand it?

HOW DO WE MAKE THIS MORE OBVIOUS?

```
class MarketingCampaign
{
    public function addAddress(
        string $address
    ): void {
        .. some implementation ..
    }
}
```

HOW DO WE MAKE THIS MORE OBVIOUS (2)

```
class MarketingCampaign
{
    public function addEmailAddress(
        string $emailAddress
    ): void {
        .. some implementation ..
    }
}
```

HOW DO WE MAKE THIS MORE OBVIOUS (3)

```
class MarketingCampaign
{
    /**
     * Adds email address, person will then be
     * messaged as part of the campaign.
     */
    public function addEmailAddress(
        string $emailAddress
    ): void {
        .. some implementation ..
    }
}
```

HOW DO WE MAKE THIS MORE OBVIOUS (4)

```
class MarketingCampaign
{
    /**
     * Adds email address, person will then be
     * messaged as part of the campaign.
     */
    public function addEmailAddress(
        EmailAddress $emailAddress
    ): void {
        .. some implementation ..
    }
}
```

ARE WE FOLLOWING PROJECT CONVENTIONS?

```
interface LocationRepository
{
    public function findClosestTo($point) ;

    public function findByName($name) ;

    public function findBySlug($slug) ;

    public function searchForLocation($name, $type) ;

    public function findAllByType($type) ;

}
```


ARE WE FOLLOWING PROJECT CONVENTIONS?

```
interface LocationRepository
{
    public function findClosestTo($point) ;

    public function findByName($name) ;

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    public function searchForLocation($name, $type) ;

    public function findAllByType($type) ;
}
```

DOCUMENT PROJECT CONVENTIONS

#coding-standards

☆ | 👤 4 | 🚩 0 | *Add a topic*



dave 10:55 AM

Naming: Do not use abbreviations



8 replies Last reply 3 months ago



dave 11:29 AM

HAS DEFENSIVE CODING BEEN USED?

```
/**
 * Set status (one of started|finished|quit)
 */
public function setStatus(string $status): void
{
    $this->status = $status;
}
```

IMPLEMENTATION

CORRECT NAMING

CORRECT NAMING

- ▶ Language for domain or project you're working on

CORRECT NAMING

- ▶ Language for domain or project you're working on
- ▶ Design patterns

HAS TECHNICAL DEBT BEEN DOCUMENTED?

```
// TODO: Refactor to method https://trello.com/c/Aaa123
```

```
... some hacky code ...
```

IMPLEMENTATION

IS ARCHITECTURE OK?

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- ▶ Make big architectural decisions before coding

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- ▶ Over architected for “future problems”?

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- ▶ Correct level of abstraction?

IS ARCHITECTURE OK?

- ▶ Make big architectural decisions before coding
- ▶ Over architected for “future problems”?
- ▶ Correct level of abstraction?
- ▶ Encapsulation / leakage?

ARE THERE ANY BUGS?!

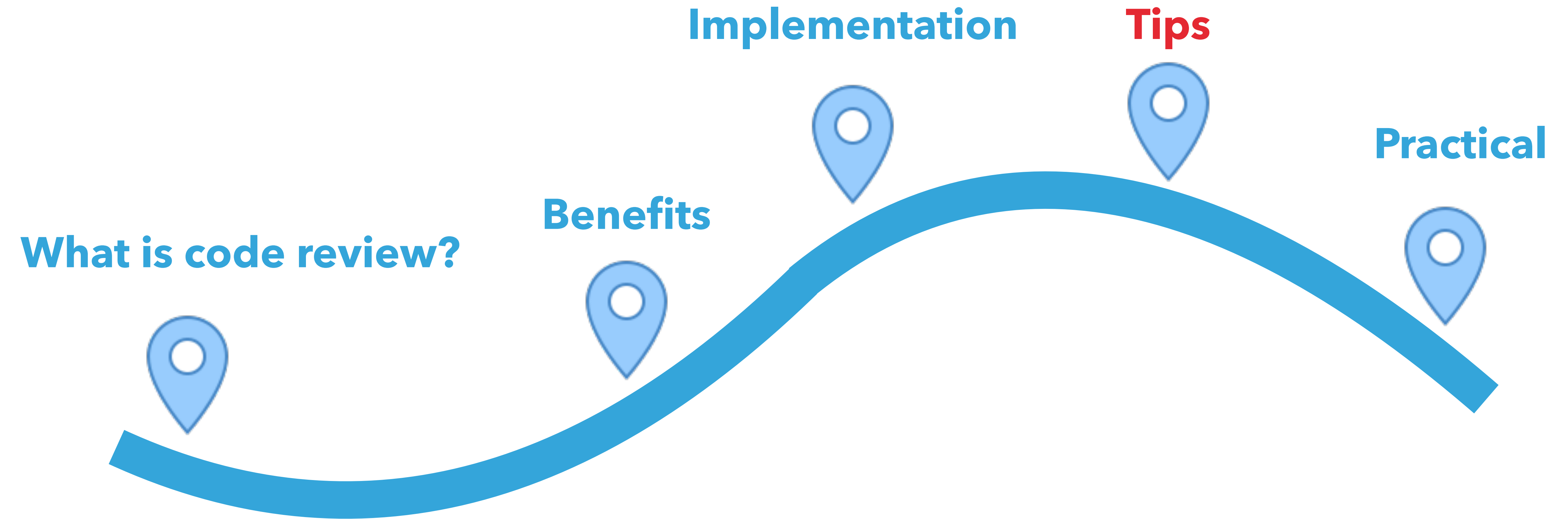
CHECK LIST

- ▶ What are we reviewing?
- ▶ Do the tests fully test the required functionality?
- ▶ Will I understand this code in 6 months?
- ▶ Do comments match the code?
- ▶ Is the code obvious and explicit?
- ▶ Does the code follow project conventions?
- ▶ Has defensive coding been used?
- ▶ Has technical debt been documented?
- ▶ Can architecture be improved?
- ▶ Are there any bugs?

CHECK LIST: TLDR

- ▶ Correct tests
- ▶ Clean code
- ▶ No bugs

AGENDA



CODE REVIEW TIPS

EVERYONE SHOULD CODE REVIEW



ASK PROGRAMMERS TO
REVIEW **10 LINES OF CODE**
THEY'LL FIND **10 ISSUES...**

Anyone who's done code review

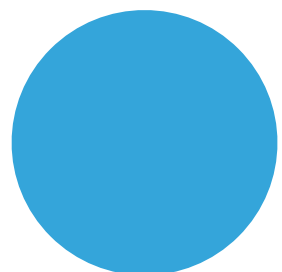
ASK THEM TO DO 500 LINES
THEY'LL SAY IT'S GOOD TO GO

Anyone who's done code review

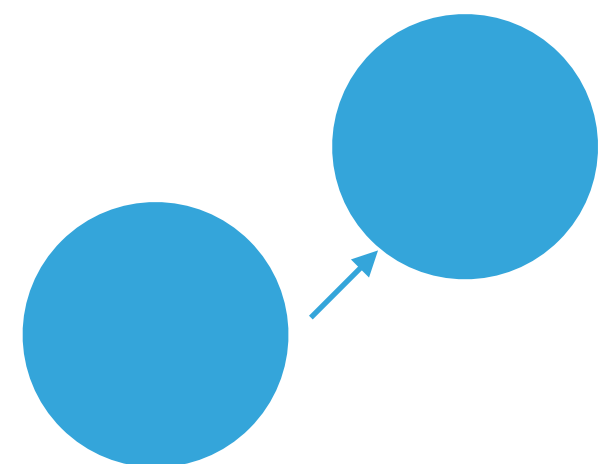
HOW MUCH SHOULD YOU REVIEW IN ONE GO?

- ▶ Fewer than 400 lines of code at a time [6]
- ▶ Under 500 line of code reviewed per hour [6]
- ▶ Max 1 hour review at a time [6]

SMALL COMMITS

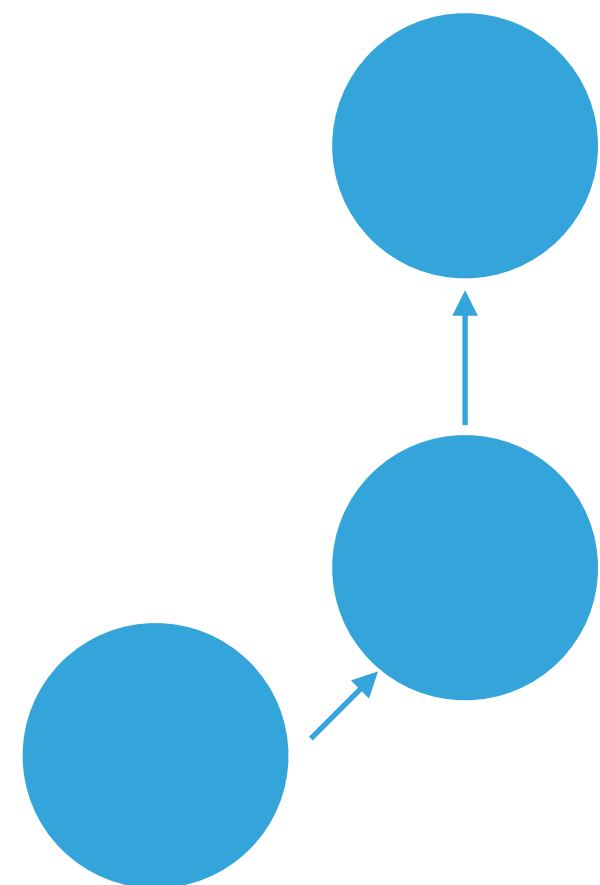


SMALL COMMITS



DEPRECATE: The price calculation service

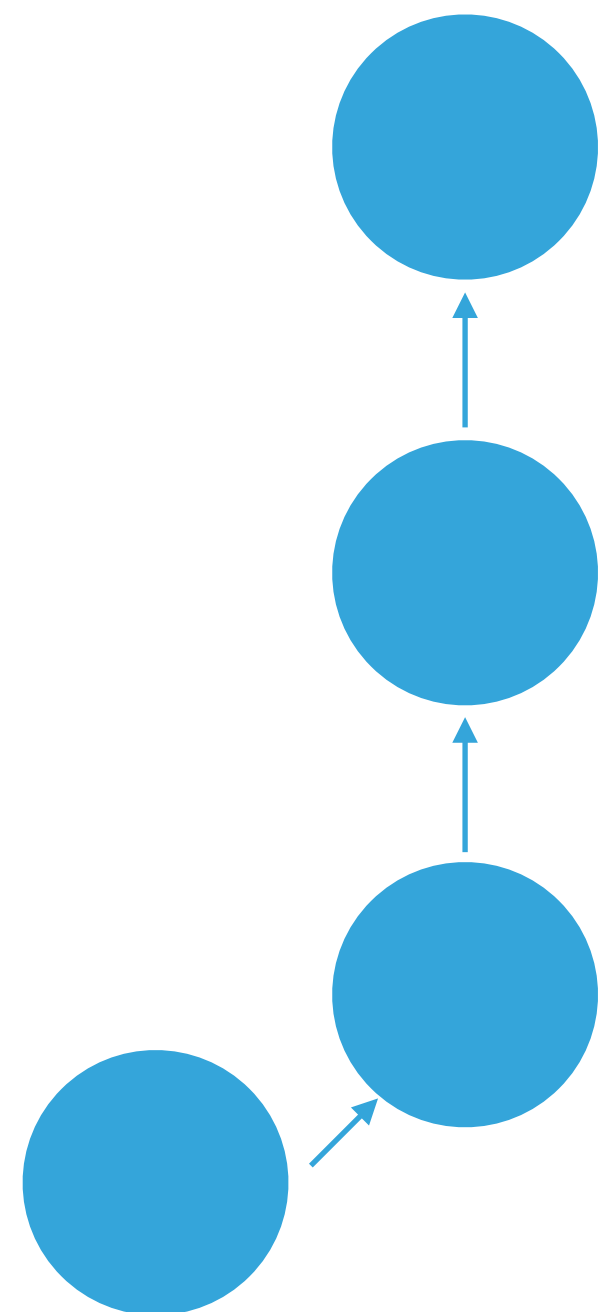
SMALL COMMITS



ADD: Facade to 3rd party price calculation service

DEPRECATE: The price calculation service

SMALL COMMITS

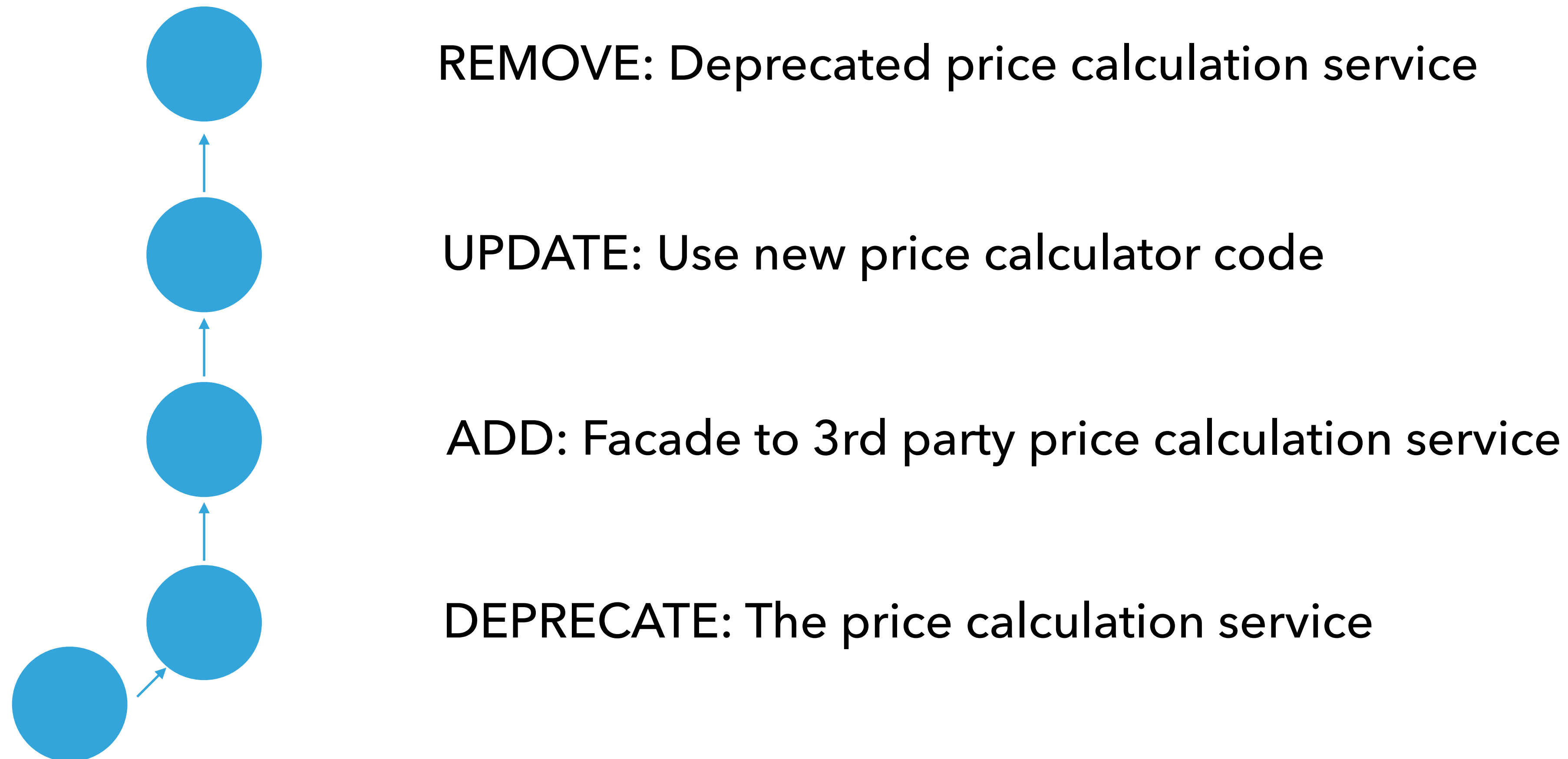


UPDATE: Use new price calculator code

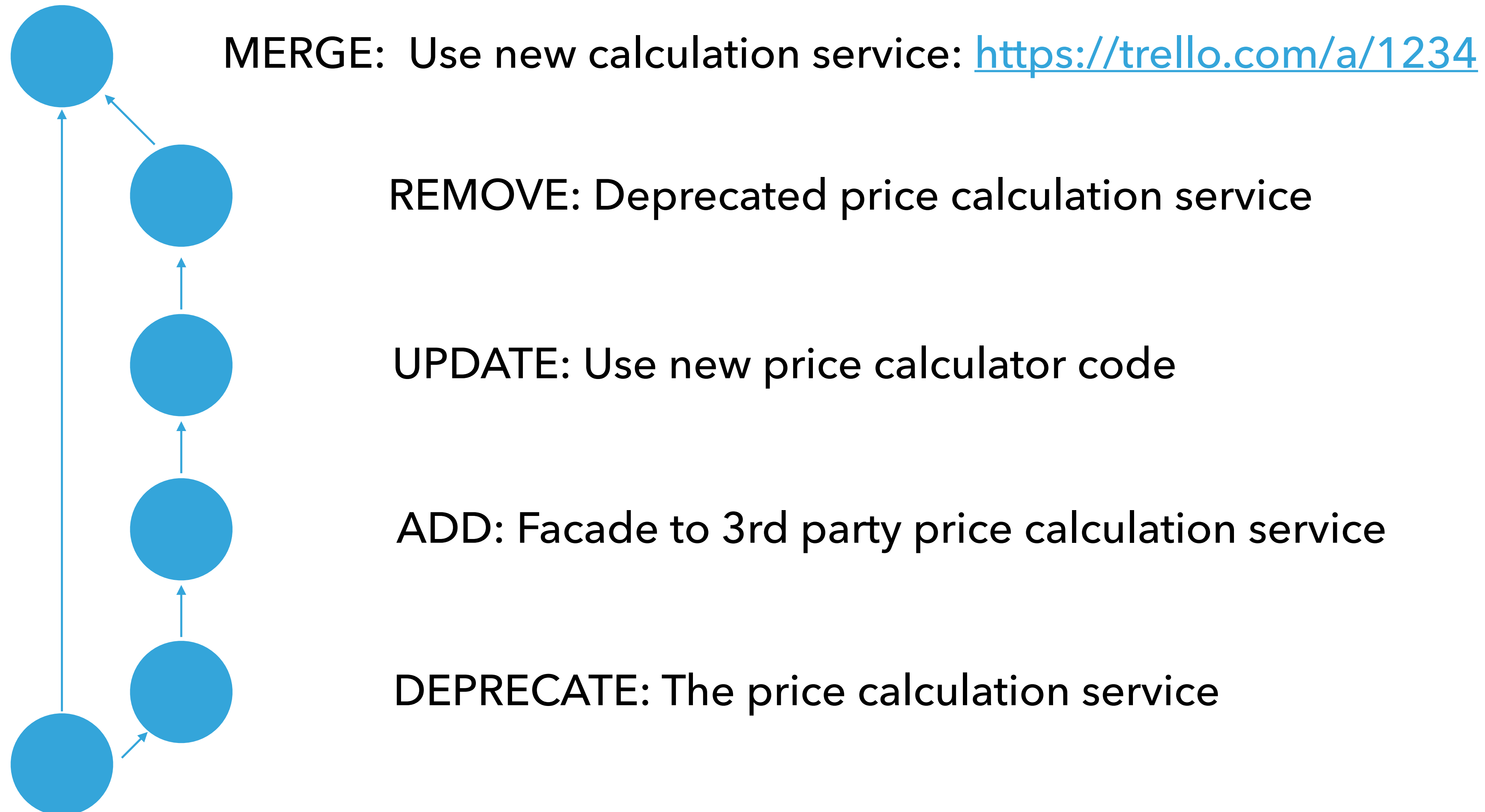
ADD: Facade to 3rd party price calculation service

DEPRECATE: The price calculation service

SMALL COMMITS



SMALL COMMITS



GOOD COMMITS

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- ▶ Small

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- ▶ Small
- ▶ Focus on one thing

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- ▶ Use individual commits for:

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- ▶ Use individual commits for:
 - ▶ whitespace changes

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 - ▶ class renames or moves

GOOD COMMITS

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- ▶ Focus on one thing
- ▶ Use individual commits for:
 - ▶ whitespace changes
 - ▶ class renames or moves
 - ▶ composer updates

GOOD REVIEW COMMENTS

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- ▶ Use: "Let's chat".
- ▶ Use: "Question".
- ▶ Compliment.

RECEIVING REVIEW COMMENTS

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- ▶ Don't take offence
- ▶ Do say if you disagree

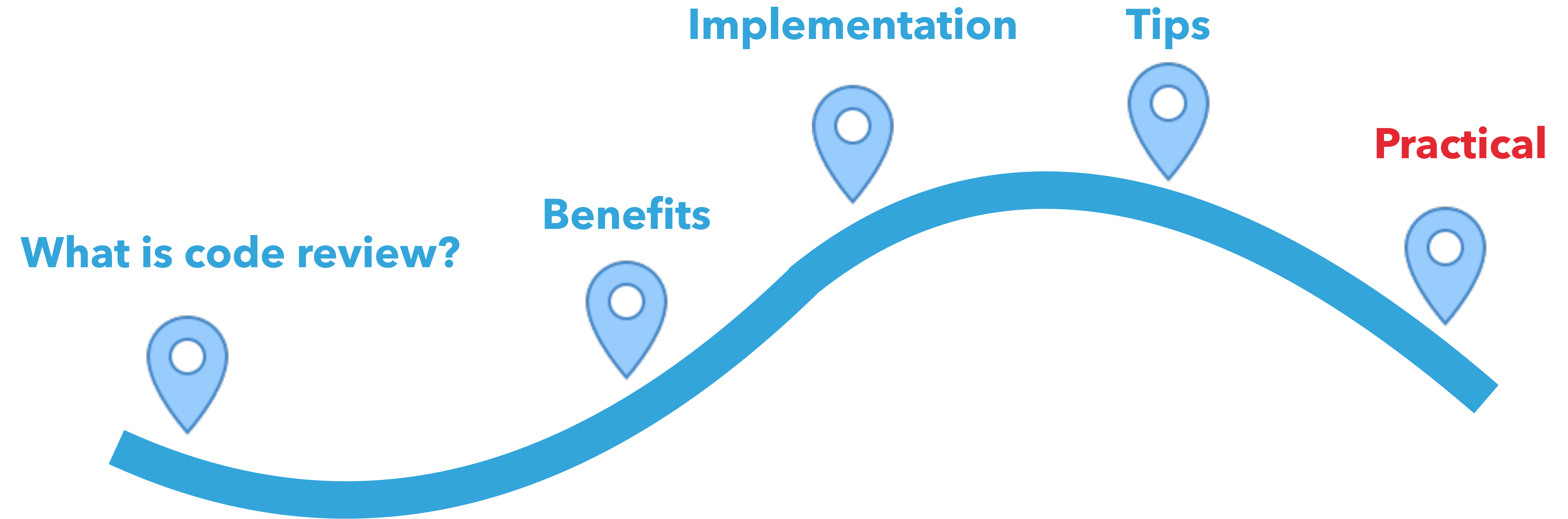
RECEIVING REVIEW COMMENTS

- ▶ Don't be an idiot. Don't be rude
- ▶ Don't take offence
- ▶ Do say if you disagree
- ▶ Compliment

CODE REVIEW TIPS

- ▶ Get everyone involved
- ▶ Keep commits small
- ▶ Be constructive in code review comments
- ▶ Link to relevant bugs / stories / Trello cards

AGENDA



CODE CAN ONLY BE DEPLOYED IF:

- ▶ CI passes
- ▶ Code review passes

SETUP GITHUB

DaveLiddament / Demo

Unwatch1

Star0

Fork0

Code

Issues0

Pull requests0

Projects0

Wiki

Settings

Insights

Options

Collaborators

Branches

Webhooks

Integrations & services

Deploy keys

Default branch

The default branch is considered the “base” branch in your repository, against which all pull requests and code commits are automatically made, unless you specify a different branch.

master

Update

Protected branches

Protect branches to disable force pushing, prevent branches from being deleted, and optionally require status checks before merging. New to protected branches? [Learn more.](#)

Choose a branch...

No protected branches yet.

@daveliddament

SETUP GITHUB

DaveLiddament / Demo

<> Code

! Issues 0

🔗 Pull requests 0

📁 Projects 0

📖 Wiki

⚙ Settings

👁 Insights

👁 Watch 1

★ Star 0

🍴 Fork 0

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DaveLiddament / Demo

Unwatch 1

Star 0

Fork 0

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Default branch

The default branch is considered the “base” branch in your repository, against which all pull requests and code commits are automatically made, unless you specify a different branch.

master

Update

Protected branches

Protect branches to disable force pushing, prevent branches from being deleted, and optionally require status checks before merging. New to protected branches? [Learn more.](#)

Choose a branch...

No protected branches yet.

SETUP GITHUB

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Fork 0

<> Code

Issues 0

Pull requests 0

Projects 0

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Branch protection for master

☒ **Protect this branch**
Disables force-pushes to this branch and prevents it from being deleted.

☒ **Require pull request reviews before merging**
When enabled, all commits must be made to a non-protected branch and submitted via a pull request with at least one approved review and no changes requested before it can be merged into **master**.

☒ **Dismiss stale pull request approvals when new commits are pushed**
New reviewable commits pushed to a branch will dismiss pull request review approvals.

☐ **Require review from Code Owners**
Require an approved review in pull requests including files with a designated code owner.

☒ **Require status checks to pass before merging**
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☒ **Require branches to be up to date before merging**
This ensures the branch has been tested with the latest code on **master**.

Sorry, we couldn't find any status checks in the last week for this repository.
[Learn more about status checks on GitHub.](#)

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Status checks found in the last week for this repository

☒ ci/circleci

Required

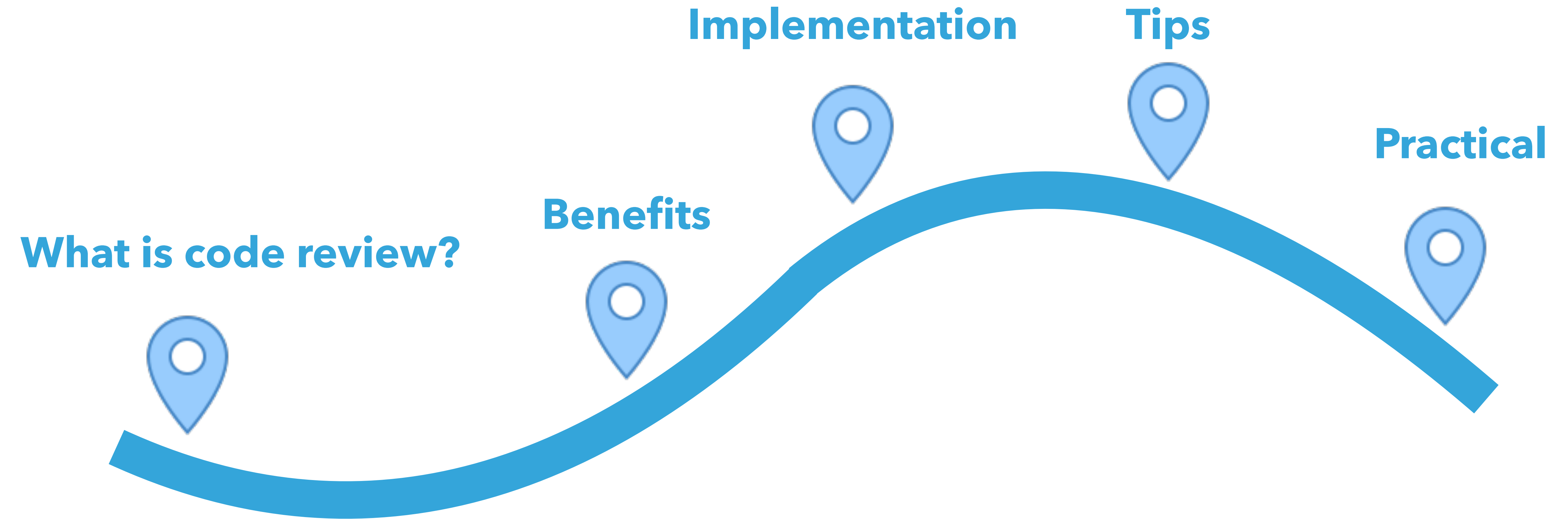
☐ **Include administrators**

Enforce all configured restrictions for administrators.

INTEGRATING CODE REVIEW INTO PROJECT WORKFLOW

- ▶ Easy with tools like Github
- ▶ No excuse not to start using today

AGENDA



**EFFECTIVE CODE REVIEW
REDUCES OVERALL COST OF
SOFTWARE DEVELOPMENT**

Dave Liddament

Lamp Bristol



Organise PHP-SW and Bristol PHP Training
Author of Static Analysis Results Baseline (SARB)
18 years of writing software (C, Java, Python, PHP)

@daveliddament

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