Tasting tests at Cookpad

by @Kazu_cocoa

for Try!SwiftTokyo

Hello, everyone.
I'm Kazu.
I'm so excited talking for many Swift and iOS developers.

Today, I will talk about "**TEST**" since I'm a test engineer.
I use "**tasting**"in my title because my company is food-related.

Kazuaki Matsuo(@Kazu_cocoa)

: Cookpad Inc.

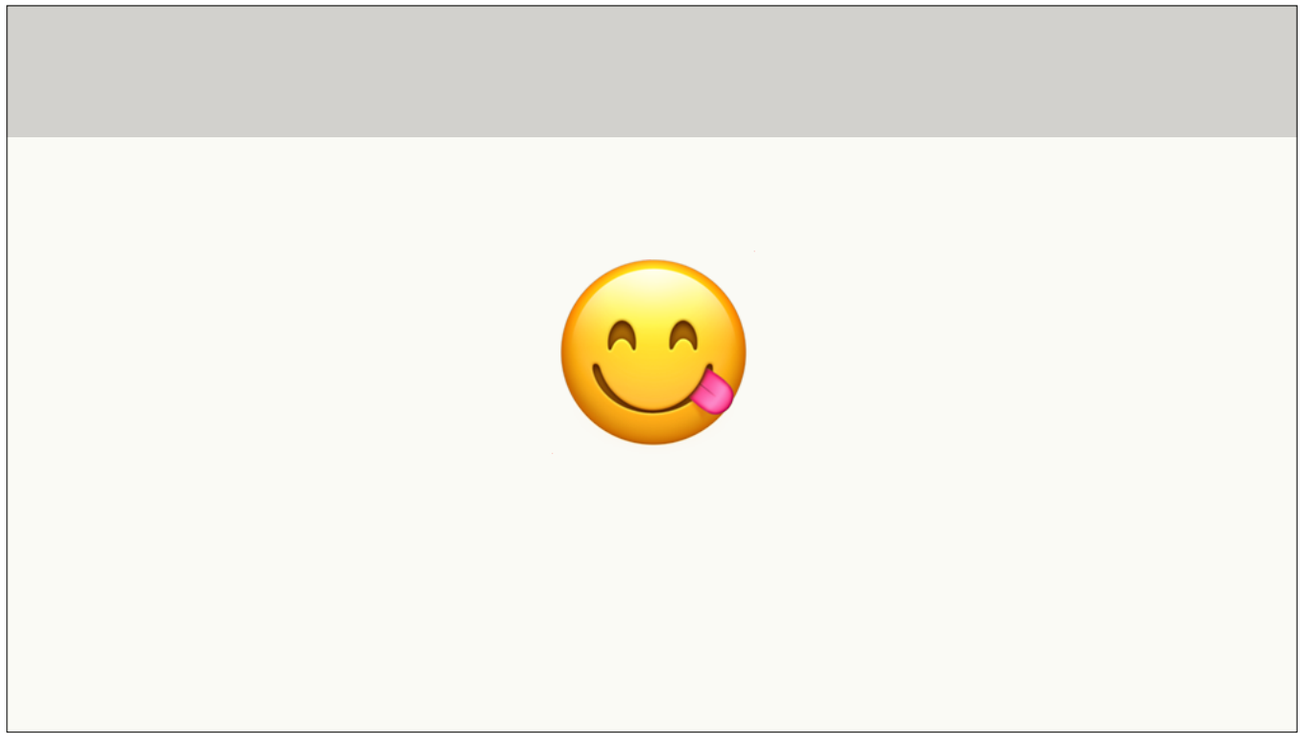
Test Engineer / Software Engineer in Quality

Lang: / / /

Maintainer: Appium Ruby binding

At first, I will introduce myself.
I'm Kazuaki Matsuo and working at Cookpad as a test engineer and Software Engineer in Quality.
I've tried test automation for mobile and improved development processes and other some roles to improve several qualities for our services.

I develop with some languages in my work such as swift, ruby, java for android and elixir.
Recently, I’m maintaining appium ruby binding.
Appium is one of the famous mobile test automation tools.



let’s go Cooking!

A bunch of themes in tests

Even we use the word **"TEST",** it has a bunch of themes and various meanings**.**
For example**,** it has **categories** such as usability test and performance test**.**

And test **level** such as unit test and integration test**,** and so on**.**

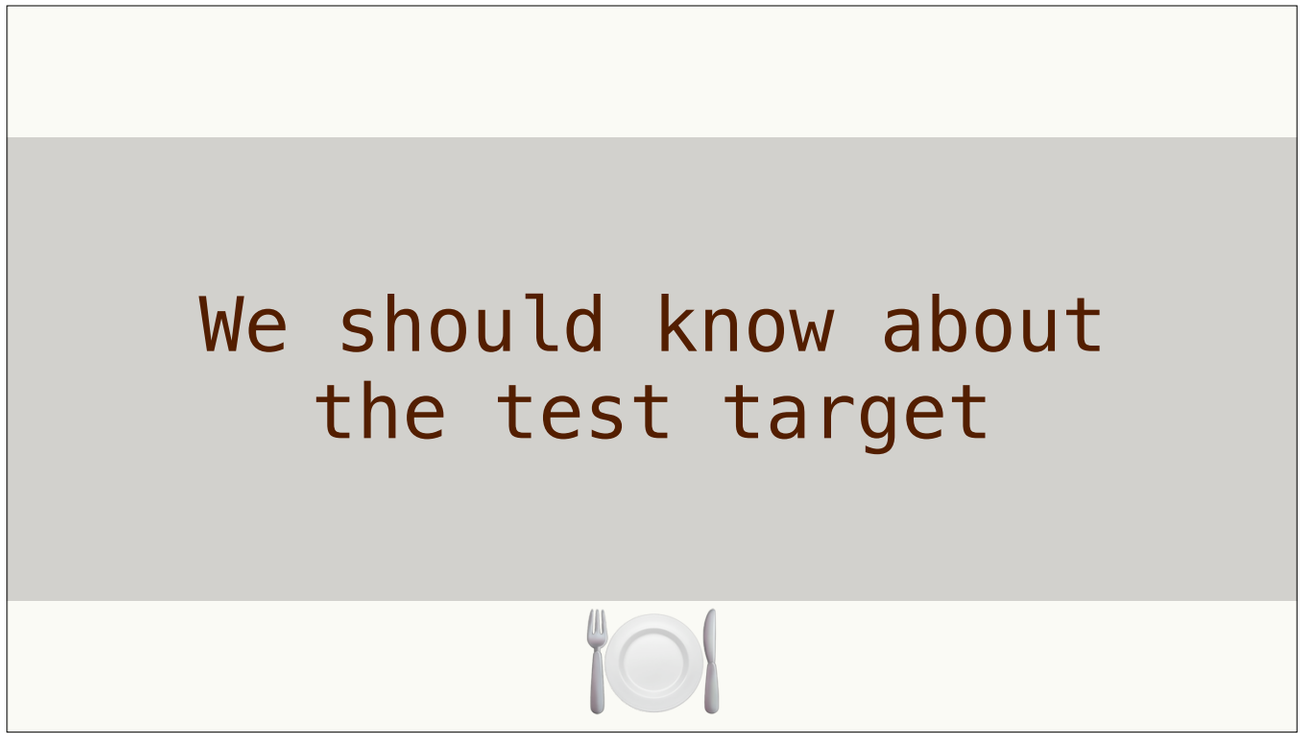
Test Level
Focus on **UI** Tests

Today, I pick up test level associated with test automation.
Especially, I focus on UI tests and how the tests support our development.
I won’t talk about unit/integration level tests today.

How UI Tests support our development

So, you can **taste** how UI tests support our development and the strategy in our app as a case study.

I'm happy if anyone gets the motivation to consider test strategy for your app and try UI tests, after my talk.



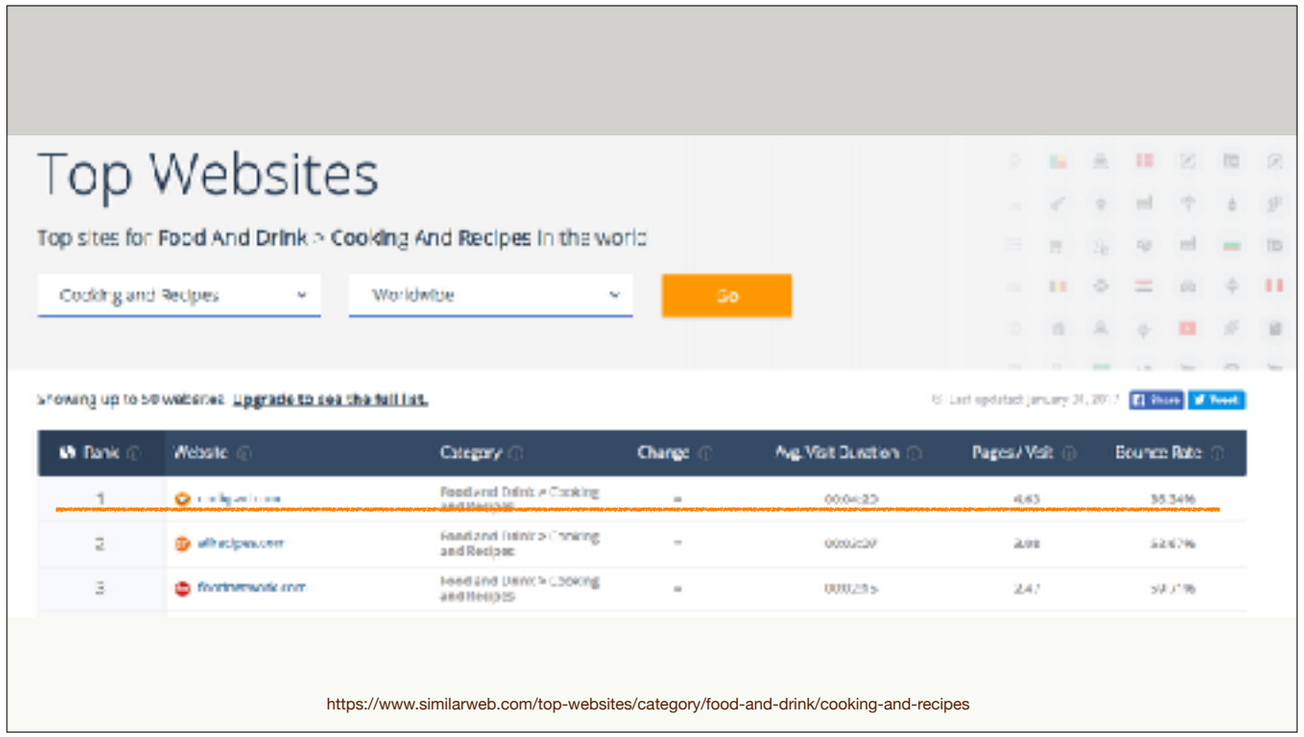
Before starting to talk about tests themselves, I’ll explain what we are targeting with our tests.
Because knowledge for the test target help you understand test strategies and today’s case study.

So, I explain about Cookpad and its iOS app at first.

What is Cookpad?

Cookpad is one of the most famous recipe sharing services in the world.

https://www.similarweb.com/top-websites/category/food-and-drink/cooking-and-recipes



https://www.similarweb.com/top-websites/category/food-and-drink/cooking-and-recipes

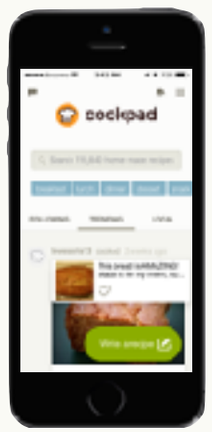
According to the similarweb.com, Cookpad is the largest site worldwide in the food category.

Currently, we provide our services for Japan and countries around the world.

https://www.similarweb.com/top-websites/category/food-and-drink/cooking-and-recipes

Cookpad for iOS(Japan and Global)

63 million users
(include Web/mobile)



35 million users
(include Web/mobile)

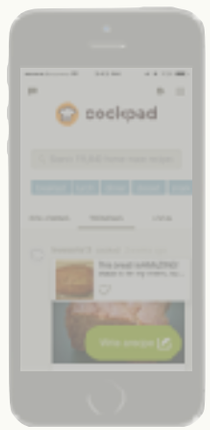
4Q and Full Year 2016 Results / https://cf.cpcdn.com/info/assets/wp-content/uploads/20170214121206/2016Q4en.pdf

We also have two kinds of iOS app.
One is for Japan and another is for rest of the world.
Their service growth level is different, so we haven't merged them yet.

The Global application can be downloaded from any non-Japanese app Store.

Cookpad for iOS(Japan)

63 million users
(include Web/mobile)



35 million users
(include Web/mobile)

Today’s test target is for Japan Edition.
Japan area is a large market for us and the app has been developed for a long time.

The app has been developed for a long time

The Japan edition has grown for around 5 years.
I attached some screenshots to show the growth and the changes.

The app changed UI component, added or deleted any features or re-write/refactor implementations during the period.

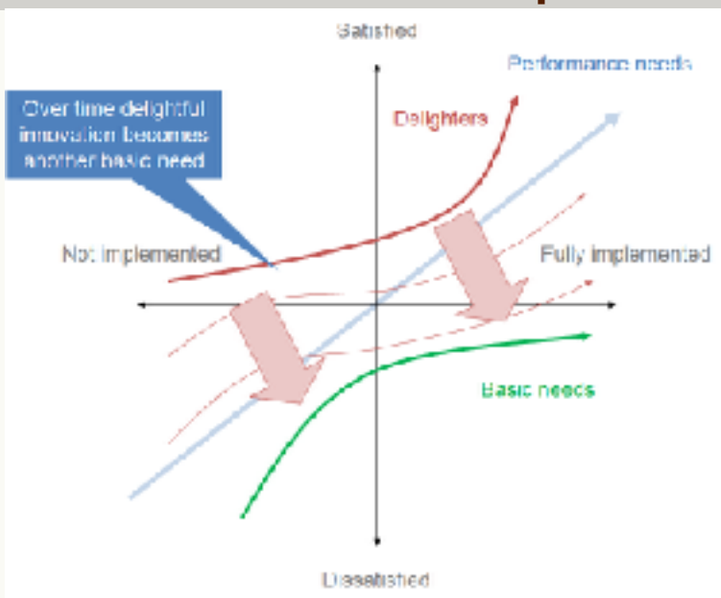
The production code also has grown and it is around one hundred thousand lines excluding for comment, blank and new lines right now.

In this period, we’ve released the app many times.

Recent our release cycle is around one month, and we released around 2weeks cycle before.
We change source code from around 5 thousand to 10 thousand per a release.

The changes have some new features, GUI update, refactor/re-wrote internal logic and so on.

kano-model and Japan market



by the way, I also explain a bit about **quality.**
kano-model is one of the famous models to explain about quality.
The model has two main quality.
One is **Must-be** Quality and another is **Attractive** Quality.
Must-be quality is a criteria you must satisfied with as basic needs.

Must-be quality in Japan have required crash-free app for almost views and no degrade features for a long time.
So, we had needed to keep crash-free conditions for Japan market in our development.

(https://en.wikipedia.org/wiki/Kano_model)

Diachronic Quality for Mobile

Mobile app's environment have been changed quickly through time.
OS versions, UI, design, user experience, required quality by market and so on.

Recently, I sometimes mention such a movement as diachronic quality.
This word is influenced by linguistics.
Diachronic means something has developed and evolved **through time.**

A bunch of mobile environments have changed through time.

take a break 🍵

Cookpad iOS app has been developed so long time.

Must-be quality in Japan is high, especially crash free rate.

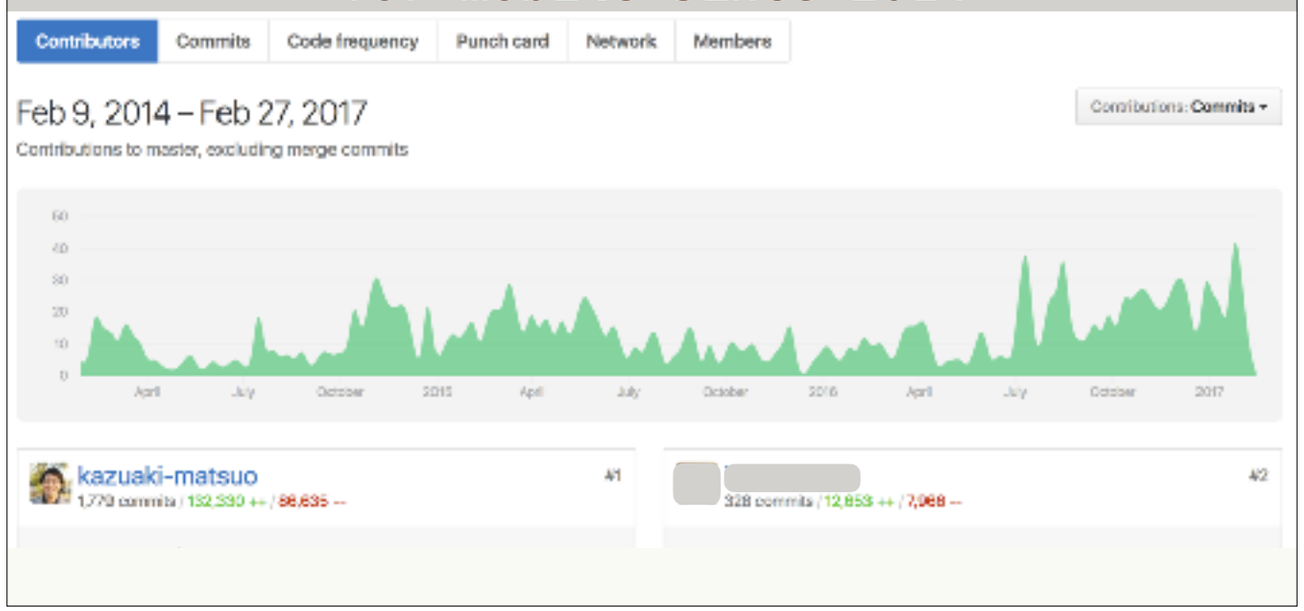
So far, I talked histories of Cookpad iOS app and how long the app has been developed for a long time.
In addition, I talked a bit about quality for japan market and mobile.

~ 7:00

Tasting how re-engineering the app with UI Tests😋🍴

I start talking how we implement and conduct UI Tests to proceed re-engineering our app.

We’ve been developed UI Tests for mobile since 2014



This graph shows commit log for UI tests I’ve implemented at Cookpad.
I've developed the environment since 2014.

Why have we implemented this UI tests?🤔

In 2014, We expected our service need to develop continuously and we should evolve apps in the future.
So, we needed to proceed re-engineering for our mobile apps.

Re-engineering means re-structured the target and make it **testable** to be able to develop stuff continuously without degrade features and keep development speed and so on.

Should we taste from?

Writing unit tests before refactoring is sometimes impossible and often pointless.

Re-Engineering Legacy Software

> Writing unit tests before refactoring is sometimes impossible and often pointless.

This sentence is quoted from "Re-Engineering Legacy Software".
It is true since we can't check behaviour without tests.

The most of the developers may agree with re-write/refactor features without tests lead unexpected broken stuff.
In addition, to make the target testable, we should consider architectures for the app and other many things if target app **isn't testable**.

On the other hand, without CI environment, it is difficult to iterate development cycle quickly without tests.

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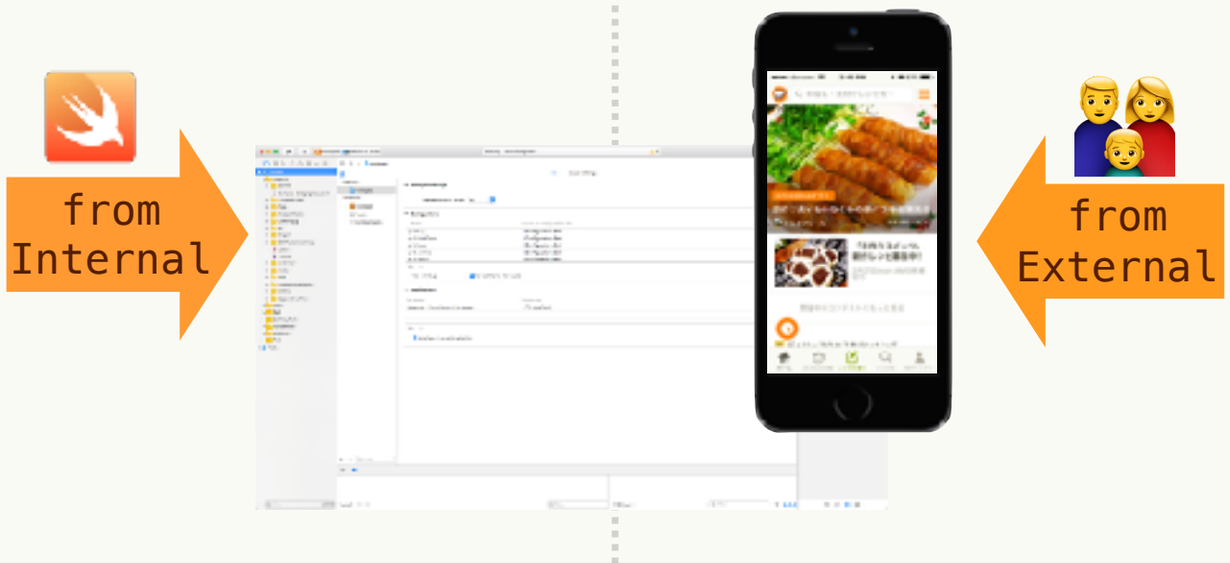
https://www.manning.com/books/re-engineering-legacy-software

Basic strategy

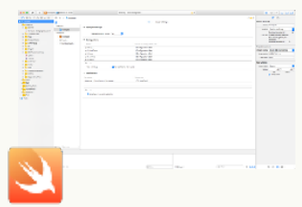


We approached to proceed re-engineering the app from two aspects, internal and external.
"Internal" means production code side.
"External" means end-user and GUI side.

Make checkable from external to internal

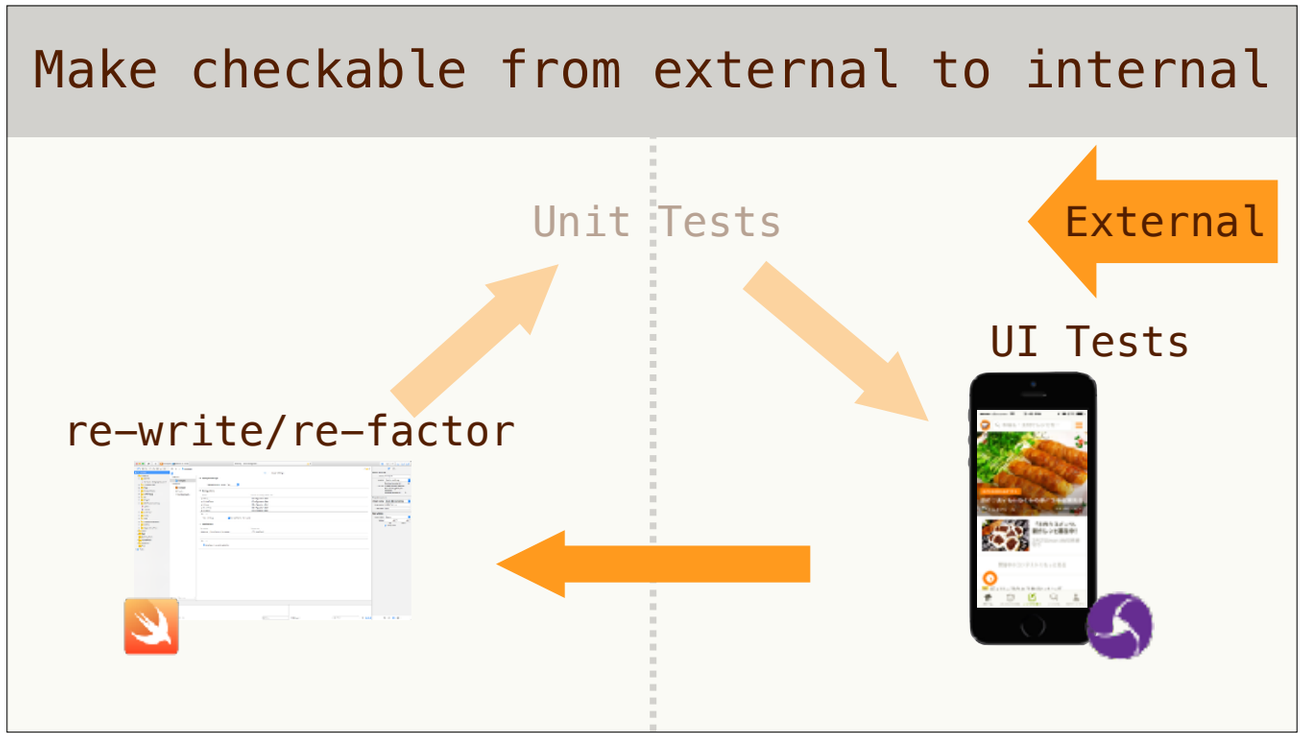
Unit Tests

re-write/re-factor

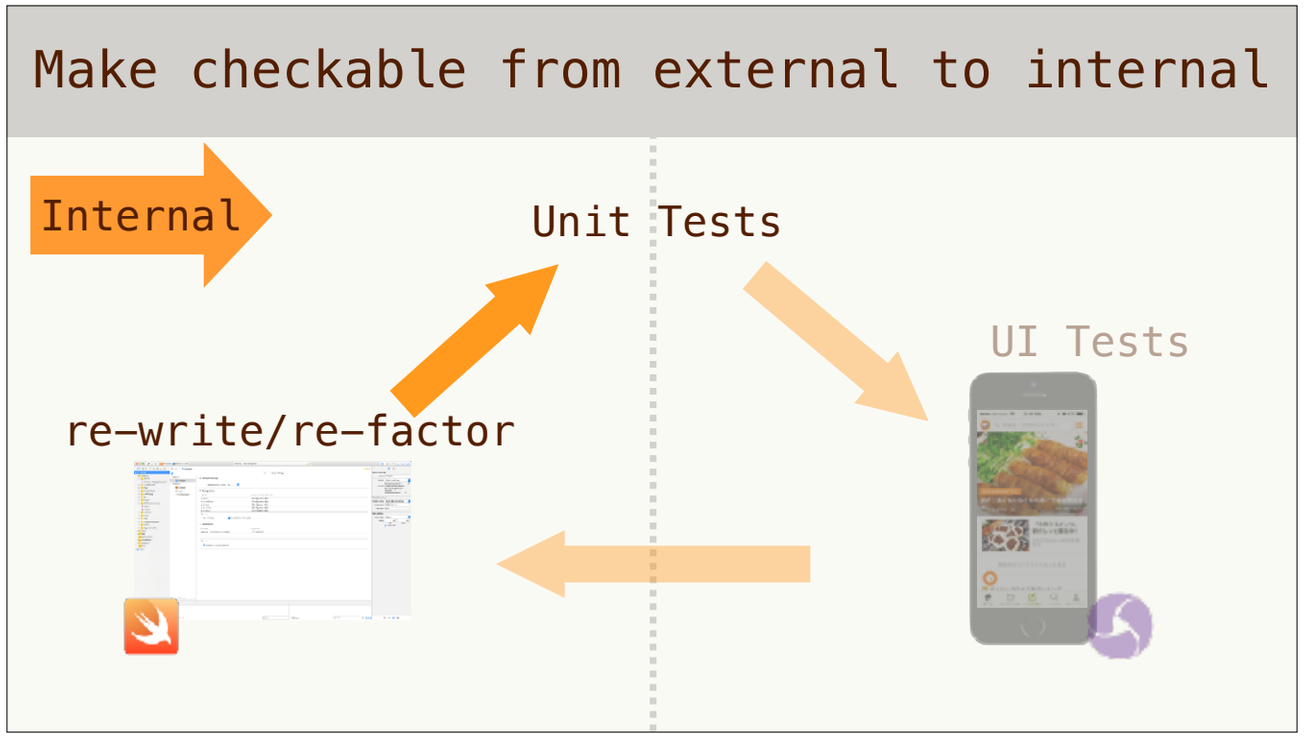


UI Tests

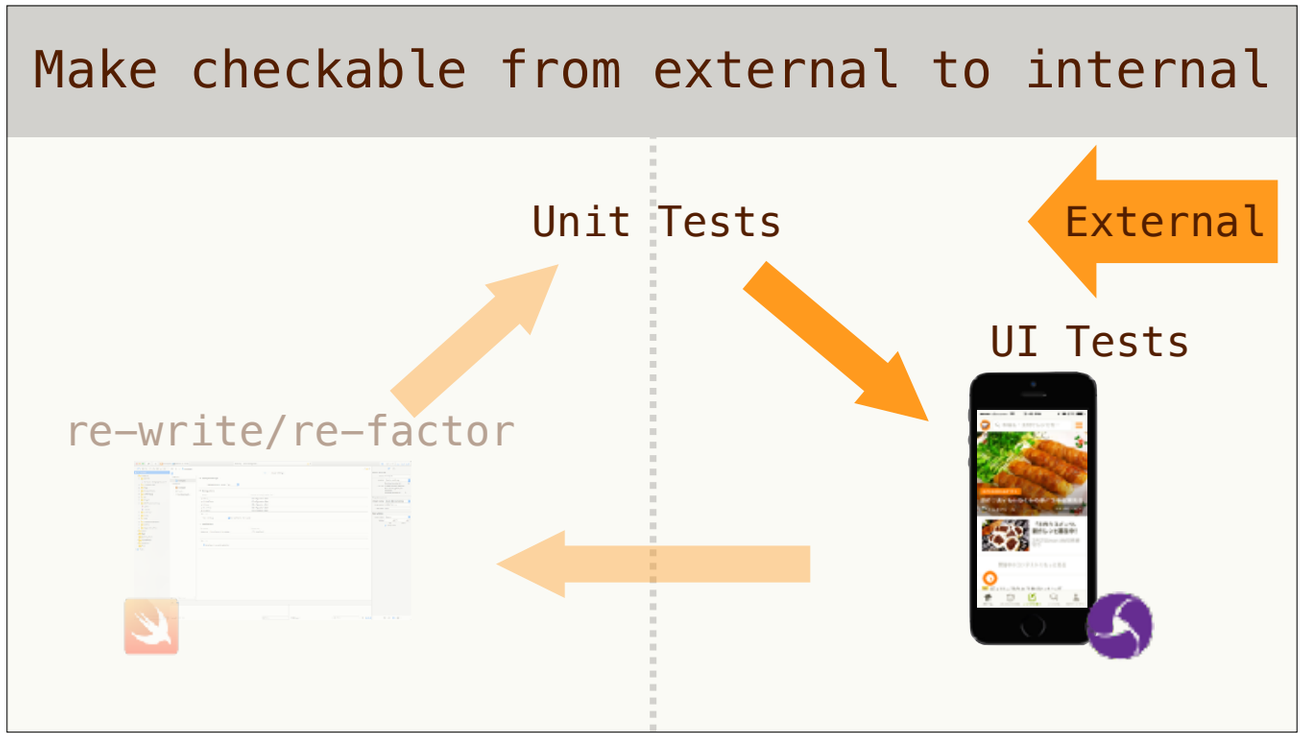
I explain a cycle.



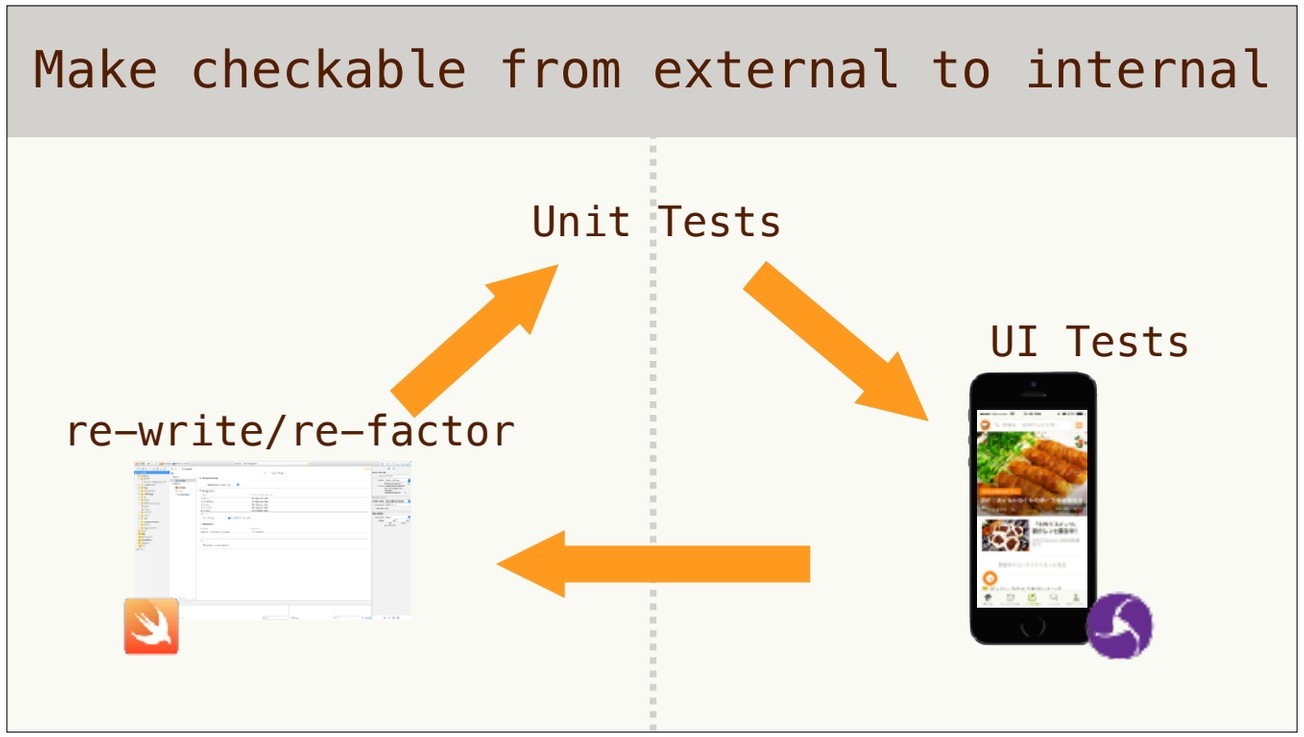
Check whether GUI, behaviour are broken from external.



And re-write/refactor/implement some features, and implement and conduct unit tests.



Check the changes from UI side to uncover errors.
Developers can find some bugs if their implementations break some other features unexpected.



If tests uncover some bugs, we can fix the issue before release.
We’ll be able to proceed re-engineering with this cycle step by step.

This kind of UI level checking is not only automated tests but also manual checking.

Unit tests for Re-Engineering

Most developers would agree that unit test should be fully automated,

Re-Engineering Legacy Software

The re-engineering also describes the following quotation.

> Most developers would agree that unit test should be fully automated,

I think most of the developers agree with this.

Unit tests are not a silver bullet

but the level of automation for other kind of tests(such as integration tests) is often much lower.

Re-Engineering Legacy Software

But, it also describes as...

> but the level of automation for other kind of tests(such as integration tests) is often much lower.

Certainly, implementing automated tests for integration and UI layer is difficult than unit layer especially mobile app.

UI Test should be automated

One area that cries out for automation is UI testing.

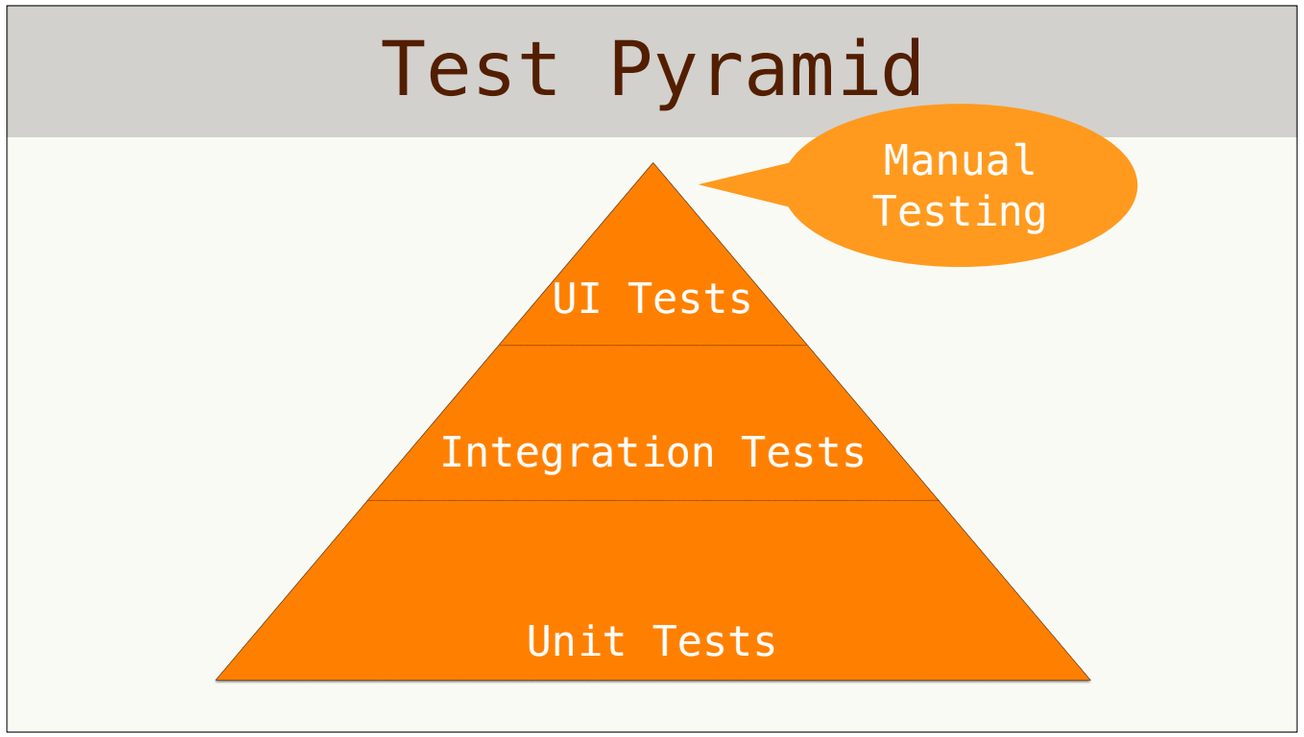
Re-Engineering Legacy Software

But...

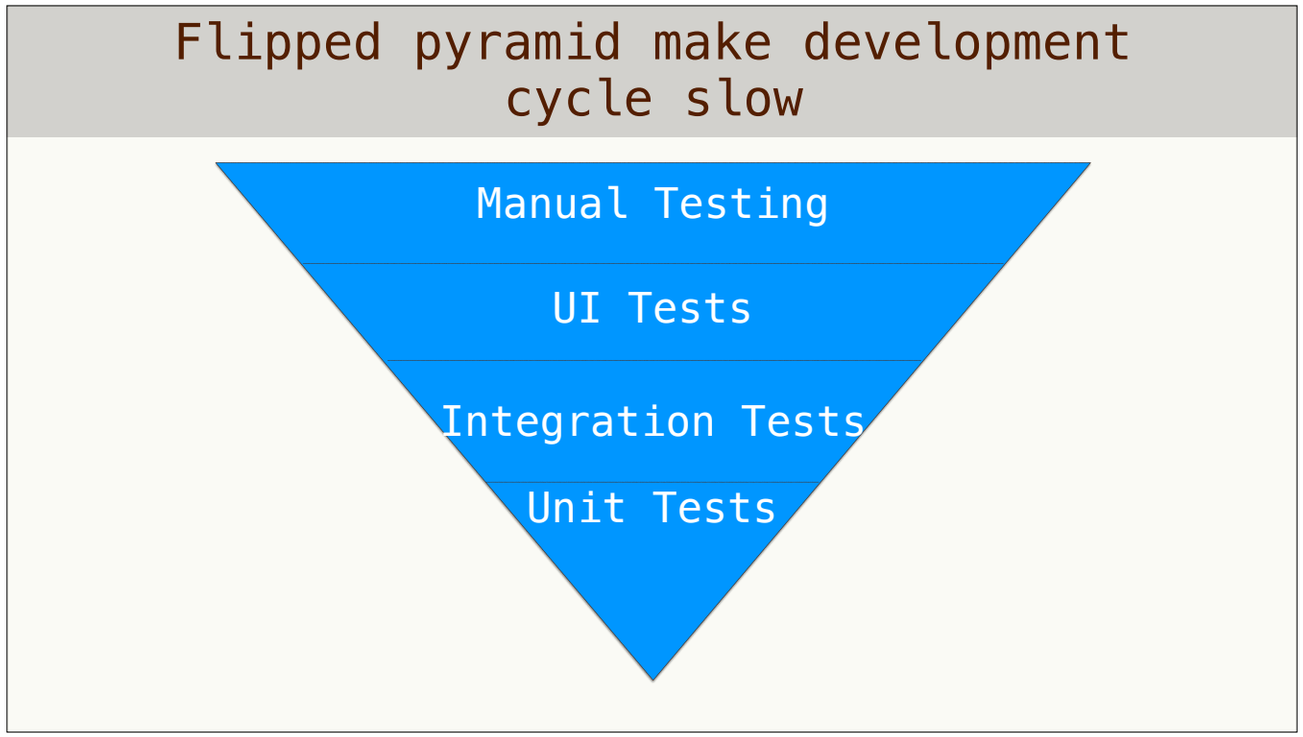
> One area that cries out for automation is UI testing.

yes, automated UI testing is very important.

In many cases, UI tests take too much time and too many human resources in mobile because test automation for mobile is difficult.
UI tests for mobile tend to conducted by manual.

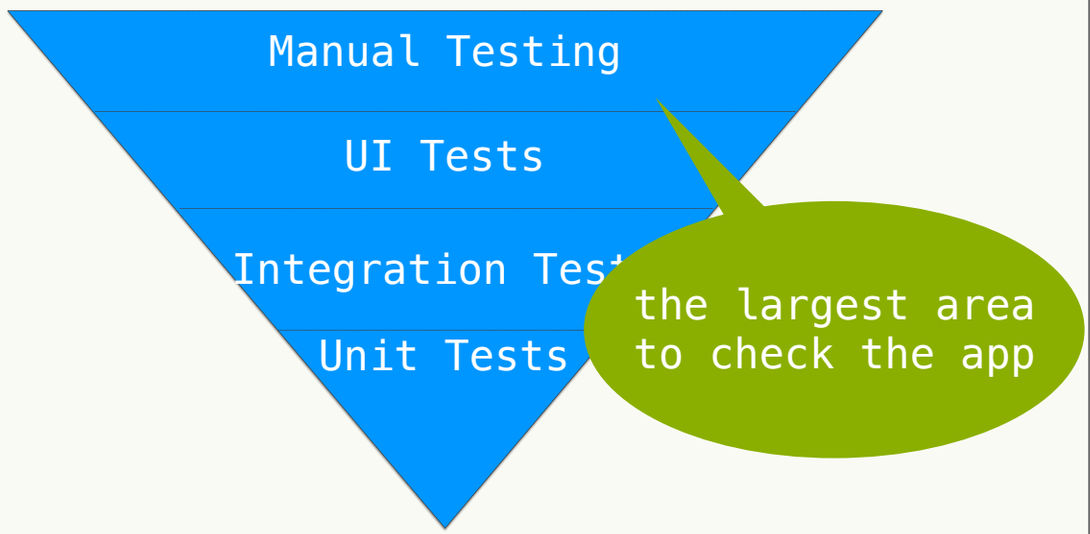


In generally, this pyramid called a test pyramid for ideal test automation.
Ideally, amount of unit tests are the largest, and amount of UI tests are the smallest is best.
Manual testing is out of pyramid.



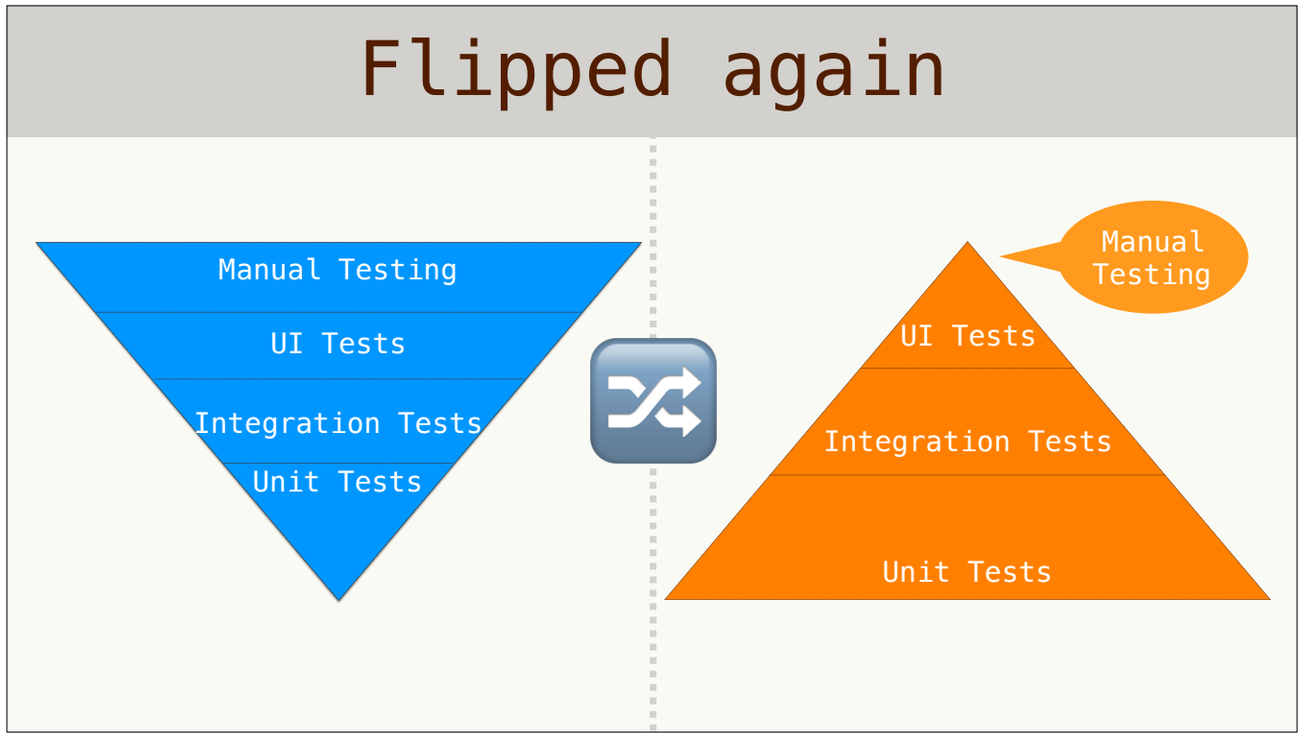
But in the mobile context, it is easy to make it flip.

Flipped pyramid make development cycle slow



Checking UIs manually is easy than test automation.
But large manual tests block swift development cycle in the future.

http://www.utest.com/articles/mobile-test-pyramid



So, converting manual checking to automated UI tests and increase unit tests is very important.

If you succeed increasing automated UI tests, you can check **automatically** most of the layouts, screen transactions and so on.

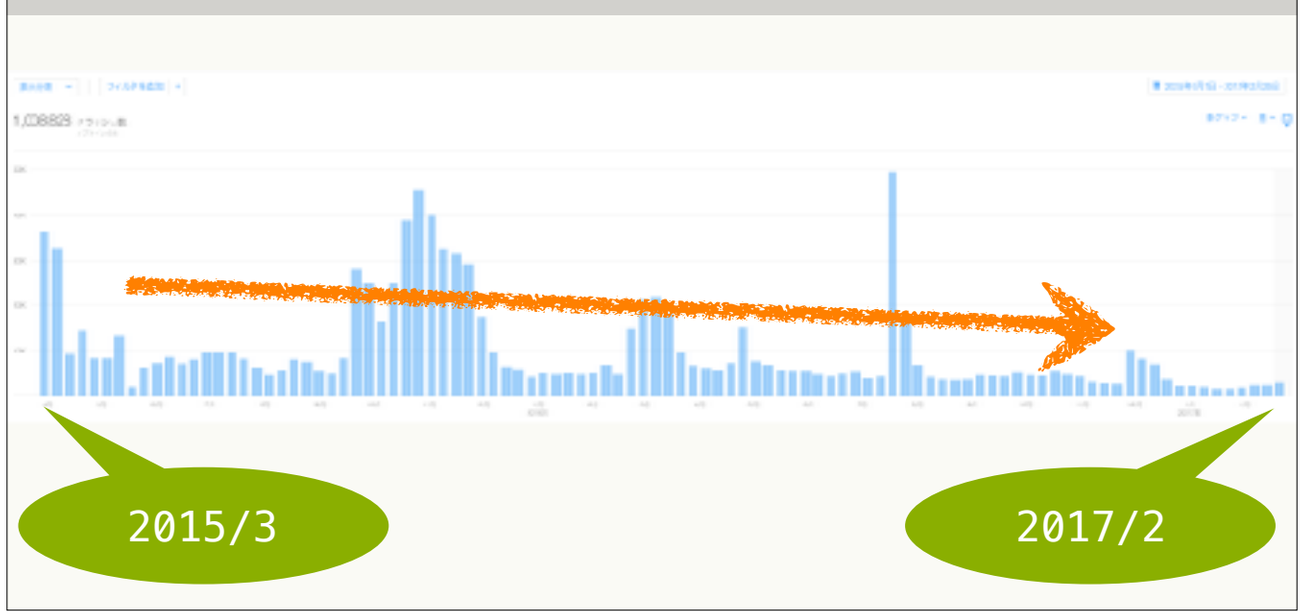
Conduct tests for combinations

	8.0	8.1	8.2	8.3	8.4	9.0	9.1	9.2	9.3	10.0
iPhone	●			●	●	●	●		●	●
iPad		●			●			●		
iPad Pro										●

You can also check combinations of various OS versions and resolutions without additional human resources.

Certainly, designing test architecture for test automation is also important.
Don't convert all manual tests to dirty automated tests.

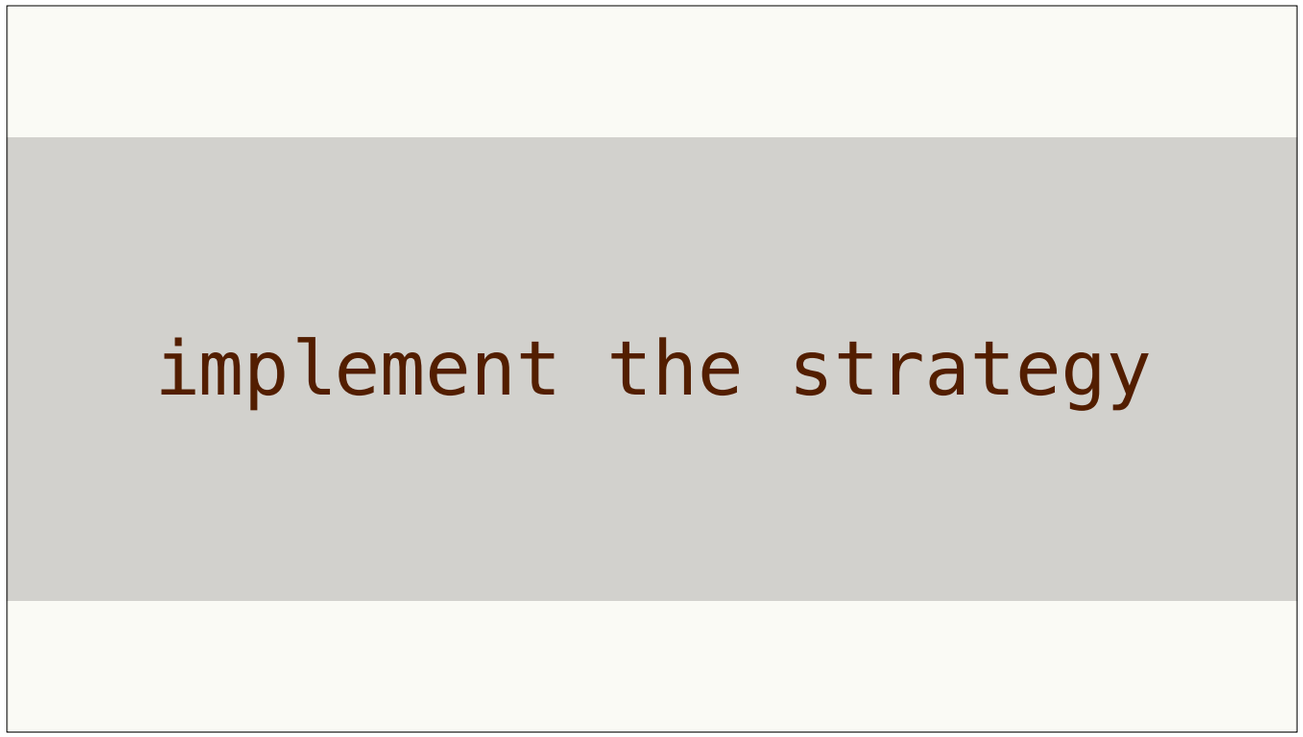
Automated UI Tests help Re-Engineering



This graph is crash count from iTunes connect.
According to the graph, the crash rate has been decreased even include all app versions.
Before 2015, this graph was more high.

We keep releasing our app during this period.
In addition, our development activities have become more active.

This result shows we achieve decreasing crash-rate and re-write/refactor keeping our development active.



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~ 11:00
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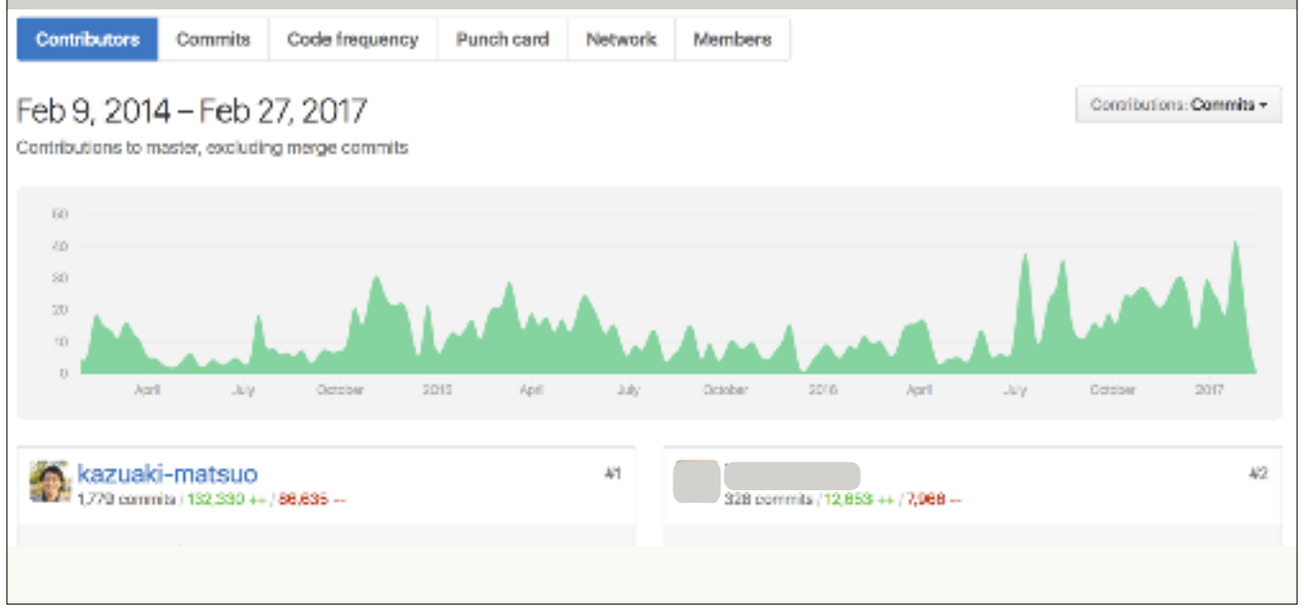
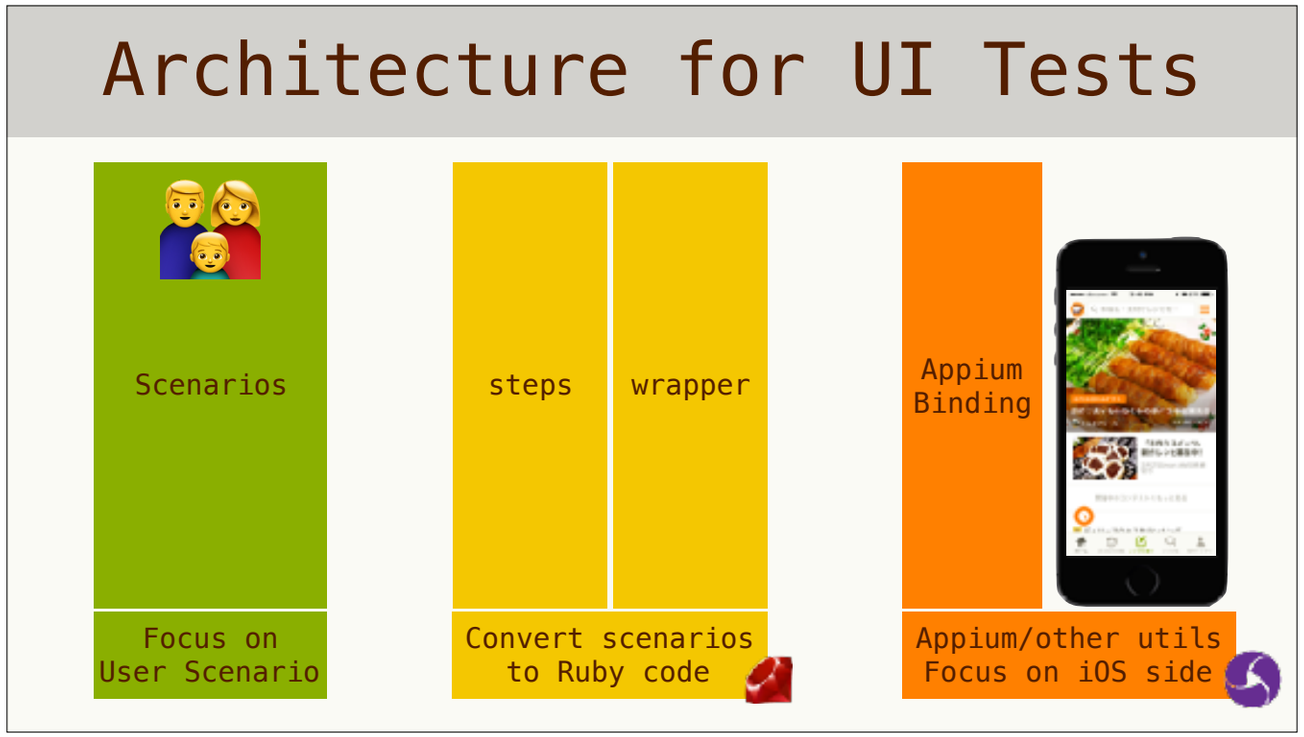
We’ve been developed UI Tests since 2014



We’ve been developed UI Tests since 2014 to support re-engineering.
At first, we had many manual tests and no automated UI tests.

But currently, we have many UI Tests which cover around 80% screen transactions, and spot manual testing.



Our architecture for the automated UI tests is like this.
We separate some layer to divide responsibilities for scenarios associated with end-users, and product code associated with the iOS framework.

This architecture keeps independence between end-user scenarios and concrete implementations depends on iOS framework.

Thus, we can decrease maintenance costs for scenarios side and iOS side.

I think separating responsibility is familiar to developers.

(http://www.slideshare.net/KazuMatsu/20141018-selenium-appiumcookpad)

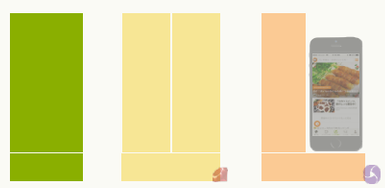
Scenarios with data-driven testing

```
feature: A user can search several words via search field
  background:
    given Conduct tests with ‘iPhone’ device

    scenario_outline: Users can see search results

      when I login with <user_status>
      when I search <search_words> via search fields
      then I swipe down ‘3’ times
      then I can see ‘xxx’ on the display

    example:
      | user_status | search_words |
      | 'ps'        | 'sushi'      |
      | 'non-ps'    | '🍣'         |
      | 'guest'     | 'sukiyaki'   |
```

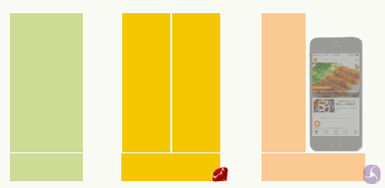


This is an example to describe scenarios.
I implement scenarios with data-driven testing style with Turnip.
Turnip allow us to describe tests with natural languages.
This scenario is close to end-user.
So, I chose the natural language to describe the scenarios.

steps/wrapper/bindings

```
step "Conduct tests with :device device" do |device|
  start_device(device)
end

def start_device(device)
  driver_start_with(desired_capabilities: des_app_caps,
                    server_caps: des_server_caps)
  set_location(DEFAULT_LOCATION)
  close_initial_information(device)
end
```



This is steps and wrappers to convert natural language to programming language.
This example is implemented by Ruby.

These two layers are foundations for UI tests.

🍛Seasoning🍲

I share some **tips** to season the tests.
tips: 発音を注意

Reduce dependency from internal product code

```
find_element :xpath,
             “//UIAApplication[1]/UIAWindow[1]/UIATableView[1]/UIATableCell[1]”
```

It is important to describe test scenarios independent of internal logic for production code.
For example.
This find_elements method try to find out elements with XPath.
XPath indicate view hierarchy(háɪ(ə)rɑ̀ːrki).
But this finding elements will be broken easily if OS version is updated.

Reduce dependency from internal product code

❌

```
find_element :xpath,
             “//UIAApplication[1]/UIAWindow[1]/UIATableView[1]/UIATableCell[1]”
```

Strongly depends on view structures 🤕

Because the path strongly depends on the iOS framework’s logic.

Reduce dependency from internal product code

❌

```
find_element :xpath,
             “//UIAApplication[1]/UIAWindow[1]/UIATableView[1]/UIATableCell[1]”
```

⭕

```
find_element :accessibility_id, “an arbitrary identifier”
```

So, use accessibilityIdentifier or label to avoid this kind of cause.

Don't conduct tests for all boundaries in UI Tests

Test for all boundaries is better to implement in the unit test.
For example, validations for text field.

Because UI test is too slower than the unit test.
So, if you implement all boundaries in UI side, it is better to move tests from UI level to method level, and remove it from UI side in the future.

More spice to extend UI tests we’ve tried.

I just explain about scenarios and its implementations for UI tests.
But test automation is not only describing scenarios but also judging results and reporting it.

image diff

e.g. Broken the order of Allow/Cancel button

for example, we also implement image diff to judge the results and **feedback to designers.**
Designers can know the differences between the previous version and the new version easily.
This helps layout checking.

image diff

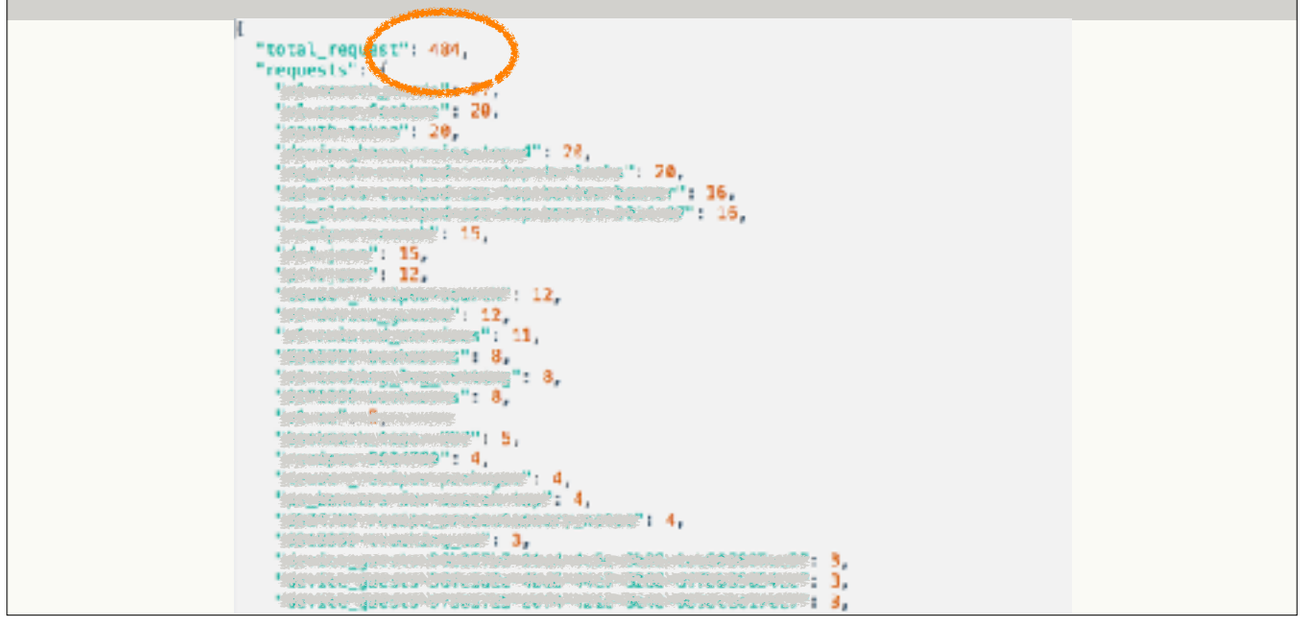
e.g. Broken the order of Allow/Cancel button

This example shows the diff on systems alert.
The diff was caused only for iOS8.1 when we refactored some internal code before.

Request counts

And we also capture network traffic for particular scenarios to uncover unexpected requests in them.

Request counts



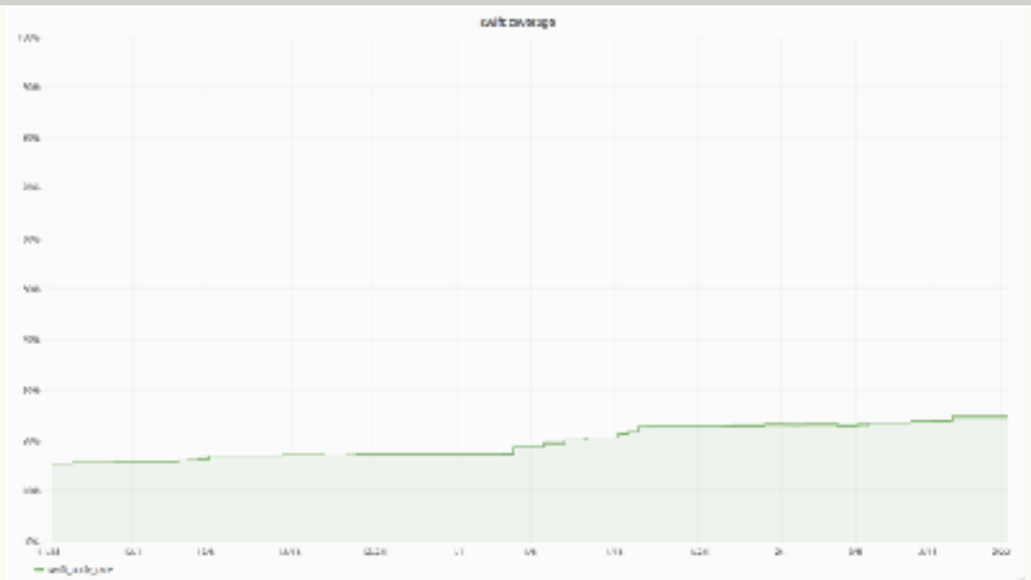
We can uncover unexpected burst requests and server loads.

Re-Engineering
re-write/re-factor without fear for developers

Keeping this kind of UI tests and other spices encourage developers re-write ,refactor and introduce new tests.

If their changes broke some features, UI tests can uncover the errors because our UI tests cover around 80% screen transactions.

introduce Swift



We start to introducing Swift into the app a few months ago.
Near 30% code is already implemented in Swift.

Also in this case, tests make developer confident changes in UI/request level.

faster🚴 and more stable

Current UI tests are enough for current our development process.
But our team will become bigger than now in the future.
So, I'll introduce alternative tools such as XCUITest or EarlGrey for UI tests partially.
But we don't stop using Appium because their responsibility area and test framework’s lifecycle is different.

Conclusion

Quality, Environment and Services change frequently in Mobile

UI Tests support Re-Engineering

I talked about histories of cookpad app and how we've tried to re-engineering the big app with automated UI tests.
UI tests need to separate responsibility from production code to catch up with some changes painless.

Do you get motivations
to challenge
automated UI Tests? 🙌

Don’t forget this kind of
challenges can’t do
in developer’s spare time

But don’t forget this kind of challenges can’t do in developer’s spare time.
Certainly, some required skills are similar for each other.
But software test and test automation needs a bit different skills and techniques.

Thanks for listening😋

Thanks for listening my talk.
And our co-workers.