

TI4Mobile

Test Improvement for Mobile app testing

Optimize your test process in the
mobile context



Who are we?



- ***Mobile app experience (by hands)***
 - No Smartphone or app experience
 - User (personal / business)
 - Beginner (no project, but starting with it soon)
 - Average (have done some testing/projects)
 - Professional (multiple app testing projects)

Content

1. Introduction

2. What's so different about mobile app testing?

3. Introduction to test improvement

4. The improvement model *TI4Mobile*

5. Key areas

- Levels
- Checkpoints
- Good practices

6. Wrap up



Mobiel bellen in 1998



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What is a mobile (wireless) application?*

- *Mobile* means a portable, lightweight, loaded with sensors device that is powered with a small battery, has limited resources and is move around by the user
- *Wireless* devices communicate with other devices without physical wires or cables (uses a mobile network)
- *Application* refers to the software used by the user on the devices. The application can be designed to run on the mobile device or use an existing application (e.g. a web-browser)

* Definition from Julian Harty, "A Practical Guide to Testing Wireless Smartphone Applications"

What makes Mobile so difficult?

What is it that makes Mobile so different?

What are the difficulties you encounter in mobile?

Difference between desktop & mobile

What is mobile app testing?

- Mobile testing is validating how the app functions in different situations and conditions

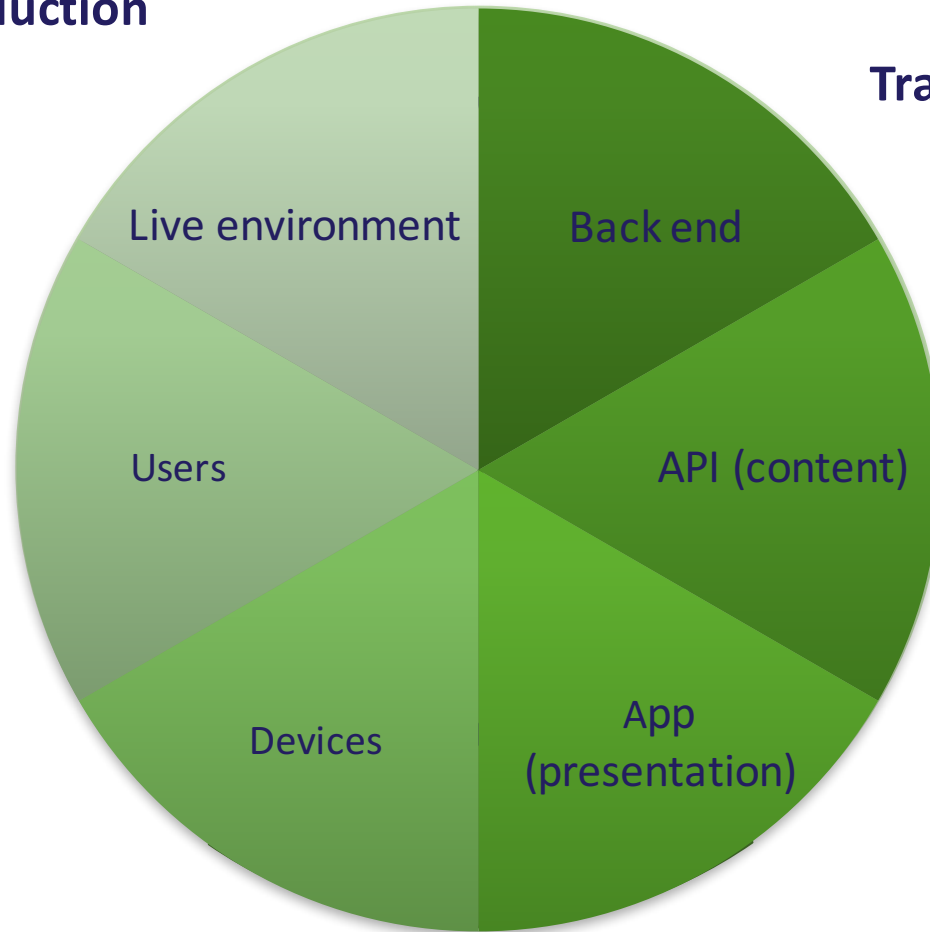


- A tester should confirm whether an app “works”, “functions as expected” and “meets the needs of your users” in its environment to ensure that users return

Mobile app testing context

Testing in Production

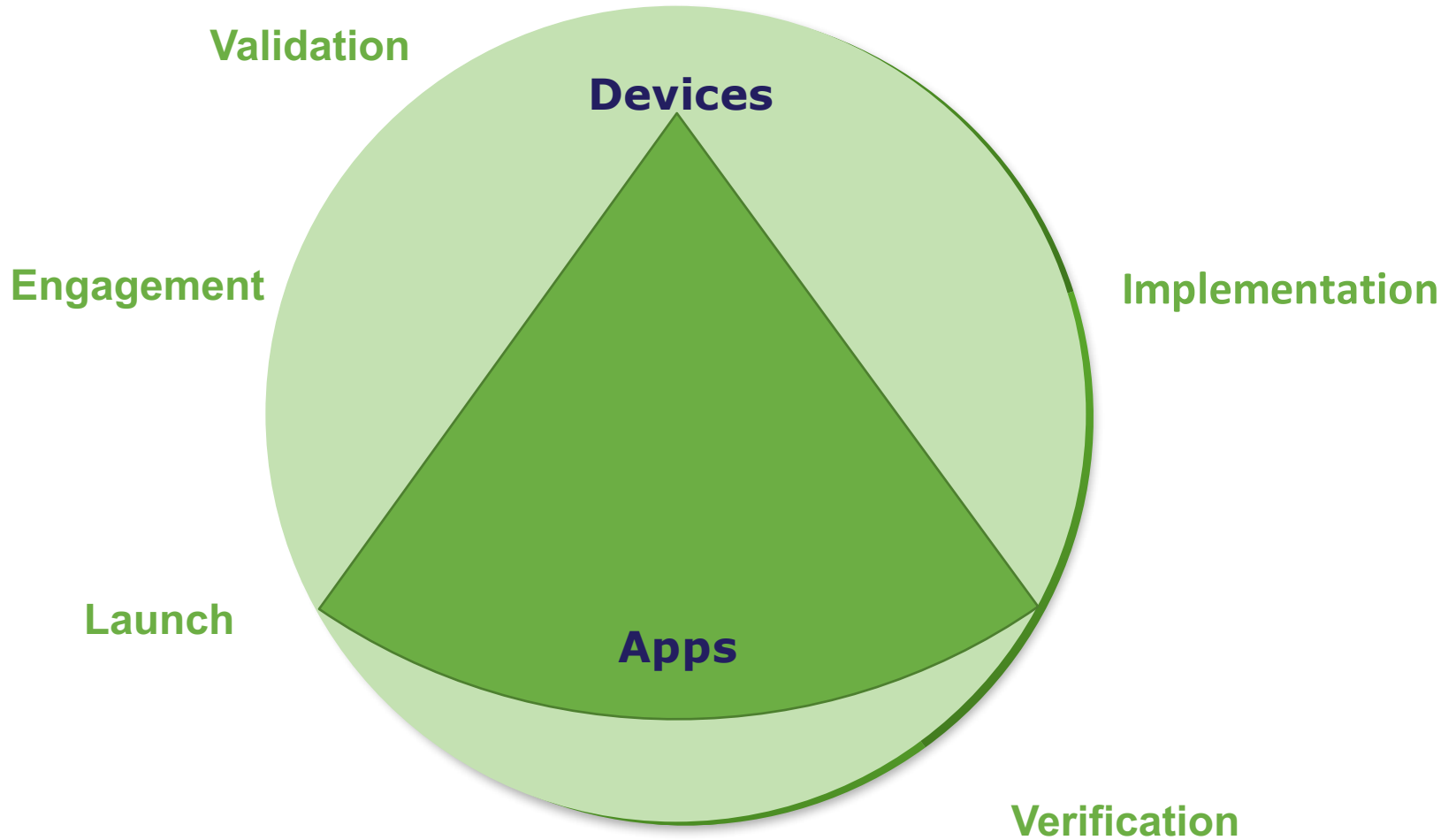
Traditional Testing



Cloud Testing

Mobile app testing

Mobile app testing context



Mobile app testing context



A set of beliefs or a way of thinking that determines one's behavior, outlook and mental attitude

Change of mindset needed

Desktop	Mobile
Wired connection	Multiple type of wireless connections
High speed bandwidth	Limited, un-stable and constant changing
(un)limited storage capacity	Small storage space
No movement	Multiple movement
No/limited sensors	Multiple sensors (Proximity sensor, tilt meter, magnetometer, accelerometer, gyroscope, ambient light sensor, vibration, cameras, flashlight, antennas, microphone, speakers, finger scanner)
(multiple) High-end 21 inch (52,5 cm) screen	5 inch (\approx 12,5 cm) screen
No power limit	(max) 10 hour battery (depended on usage)
Active heat control fan	Passive heat and power saving mode
Keyboard/mouse input focus	Gesture focus
Form factors are stabile	Form factor development is very dynamic (screen resolution, touch screen, orientation, button, layout of a device (bar, flip, tablet, slider, watch, headset)

Great apps and not so great apps

- What are great apps and why?
- What are not so great apps and why?



★★★★★ It's great.

★★☆☆☆ I don't like it.



Bad apps = Awareness triggers!



eddy leijte 7 juli 2016



Hij werkt niet de app



Roy Heeffer ★★★★★

Ik kan niet inloggen?



Ilona Van Der Vlies 3 juni 2016



De ene keer als ik op stop druk blijft de tijd staan en de andere keer springt hij weer op nul



GameLady 16 mei 2016

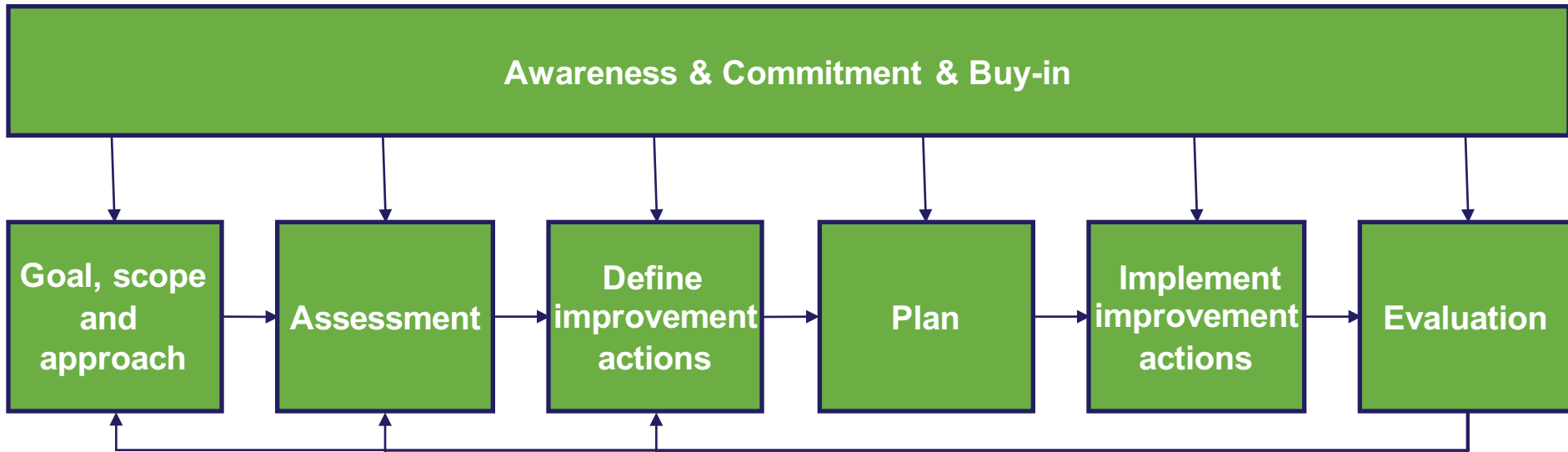


Waardeloos!!! Werkt niet! Kan niet synchroniseren... Echt waardeloos!!! Gaat inmiddels beter, maar nog niet helemaal perfect....

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Test Improvement Roadmap



Mobile app risks

Users

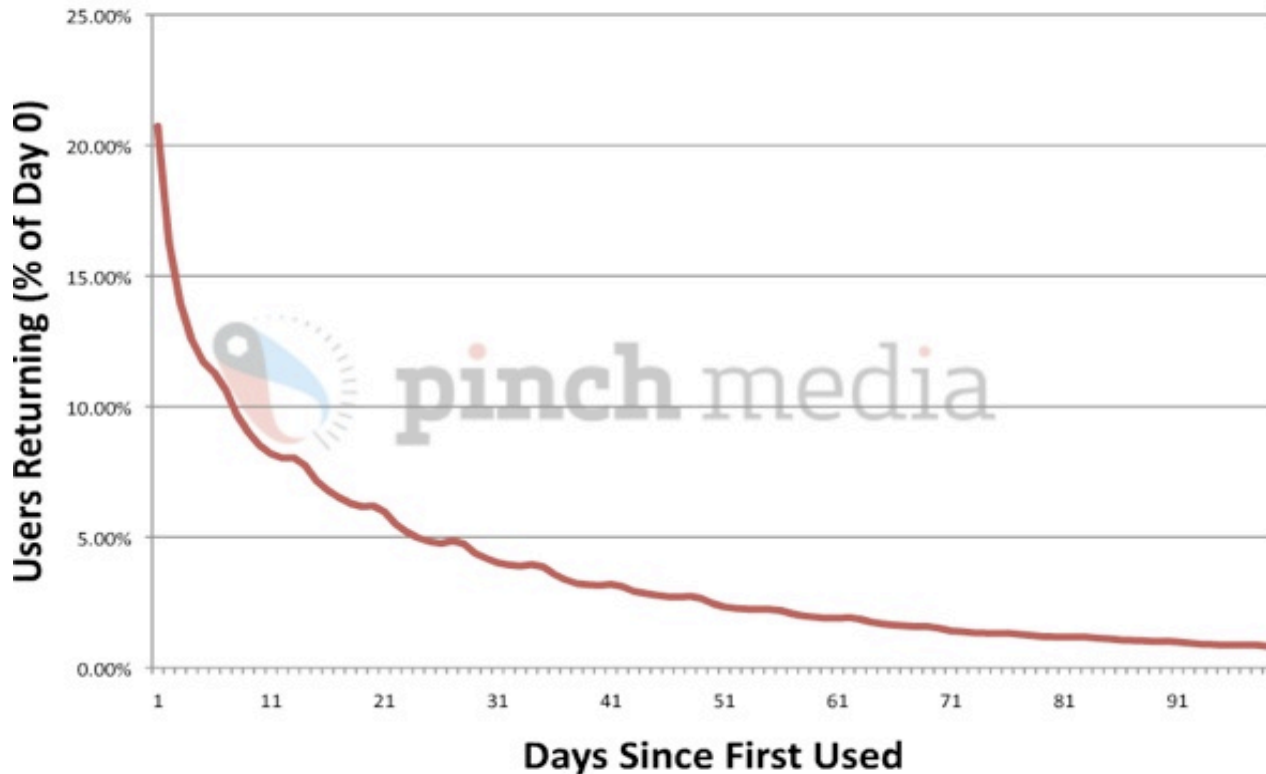
Don't search for it, no added value, can't find it, can't install it, don't know how to use it, can't give feedback

Life span

Most apps only live 60 days on a device because the "first impression" is not a big success moment

Life span of an app

Free Applications - Usage Over Time



Most apps only live 60 days on a device because the “first impression” is not a big success moment



Test Improvement Roadmap

Awareness & Commitment & Buy-in

Goal, scope
and
approach

Assessment

Define
improvement
actions

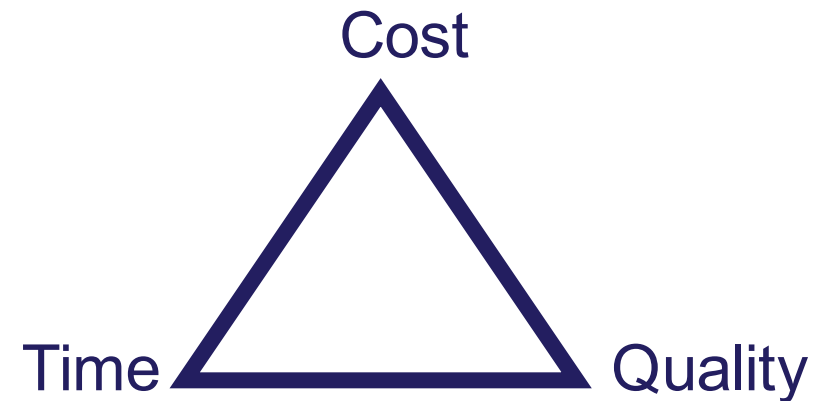
Plan

Implement
improvement
actions

Evaluation

Goal, target, objectives, aim

- Time to market
- Costs
- Software/Testing quality



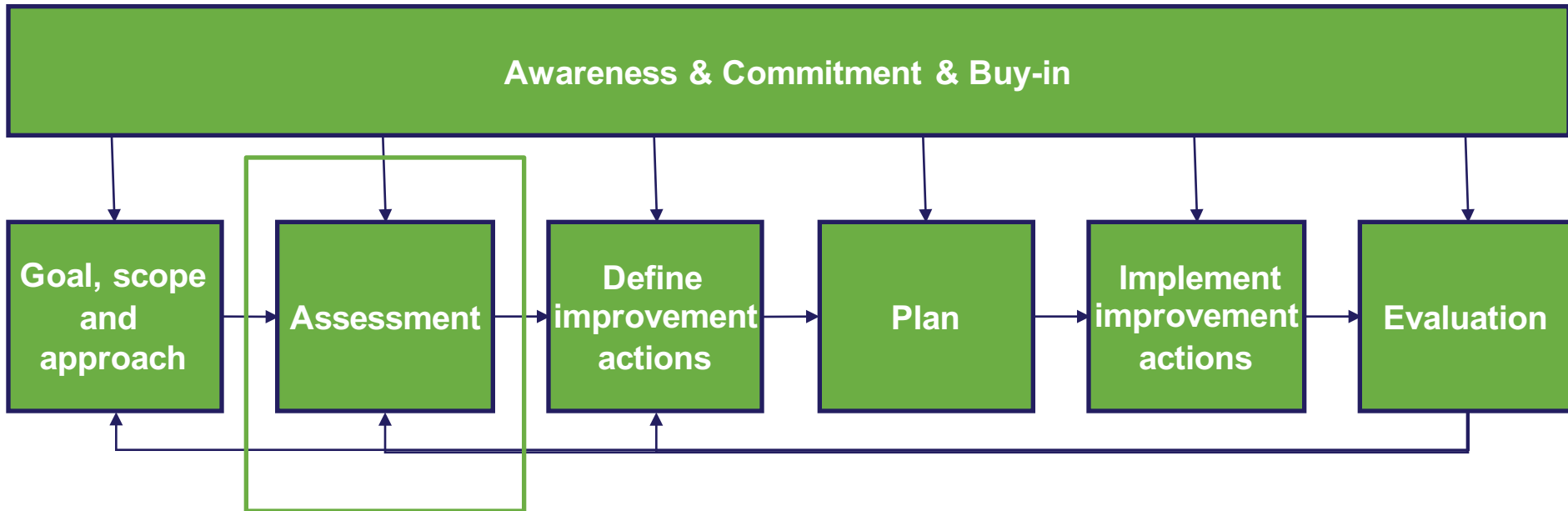
Case 1: Triggers

Hand out

- Form groups
- Read the case

- What is the reason of the test improvement project?

Test Improvement Roadmap



Assessment – gather information

- Interviews
- Document study
- Observations

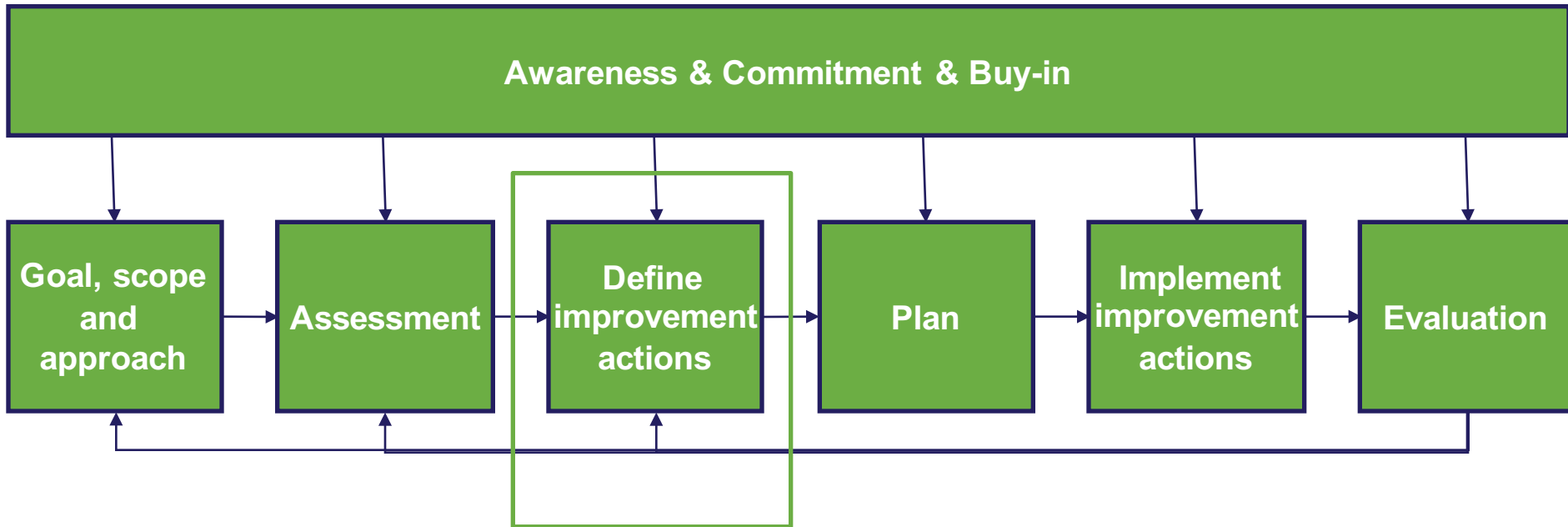
Can you find the 7 Differences?



Approach

Topics	Functions				
	Manager	Test Manager	Tester	Developer	Etc.
...	✓	✓			
...		✓	✓	✓	
...		✓	✓	✓	
...	✓	✓		✓	
...	✓	✓			
...		✓	✓	✓	
...					

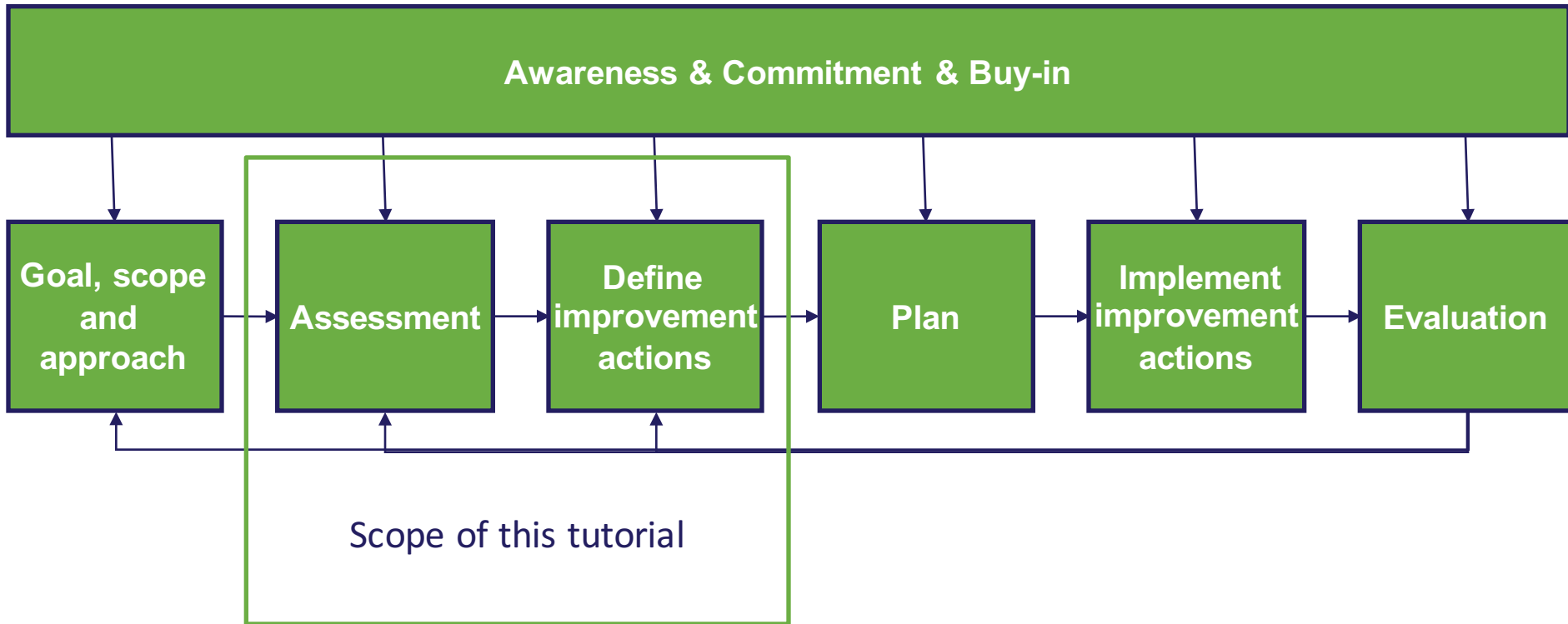
Test Improvement Roadmap



Assessment – information analysis

- SWOT analysis
 - Strengths
 - Weaknesses
 - Opportunities
 - Threats
- Define improvement actions
 - Create overview of quick wins and short and middle term improvement suggestions.
- How to define improvement suggestions
 - Expertise of the assessor
 - Reference model
 - Context driven

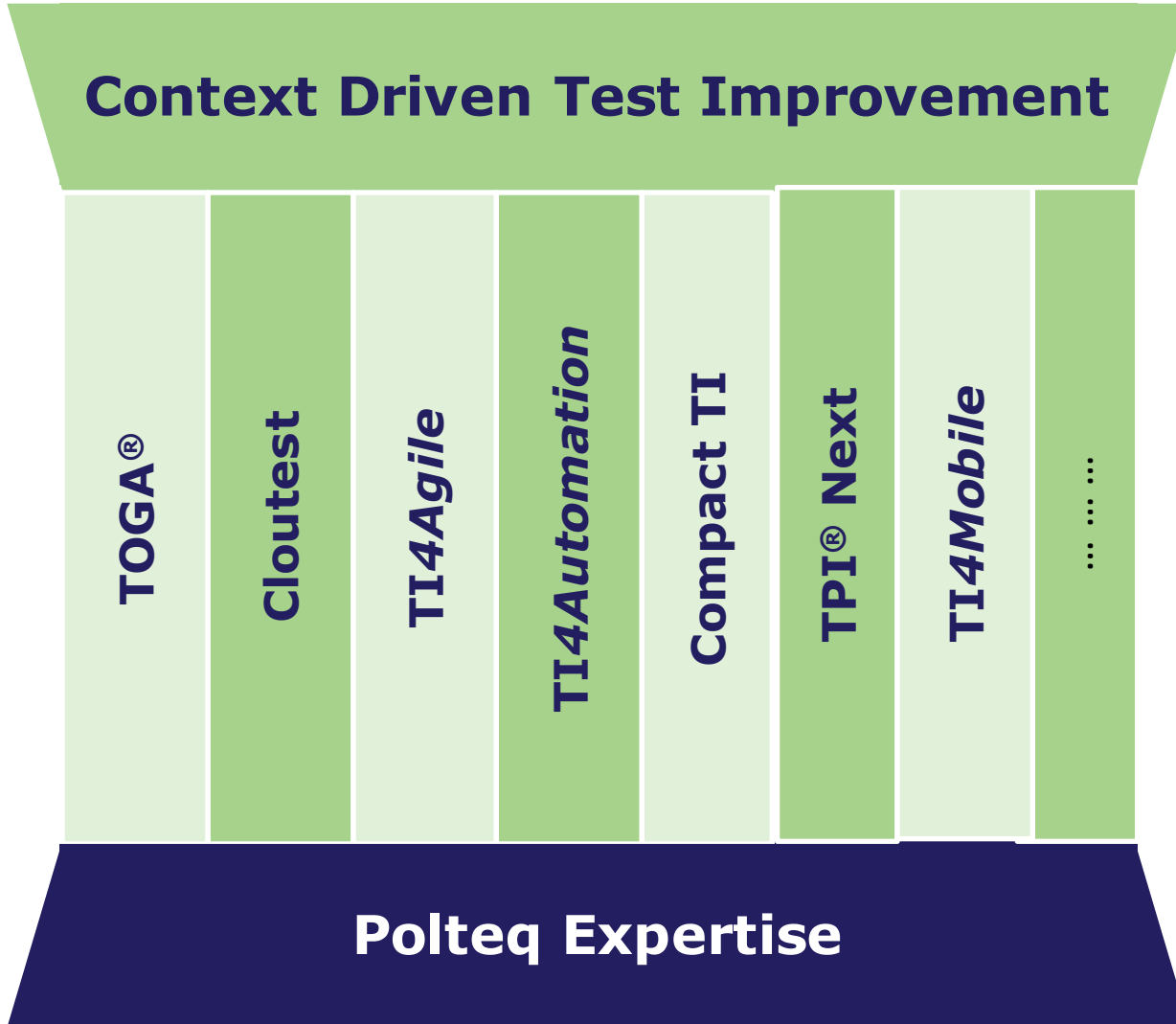
Test Improvement Roadmap



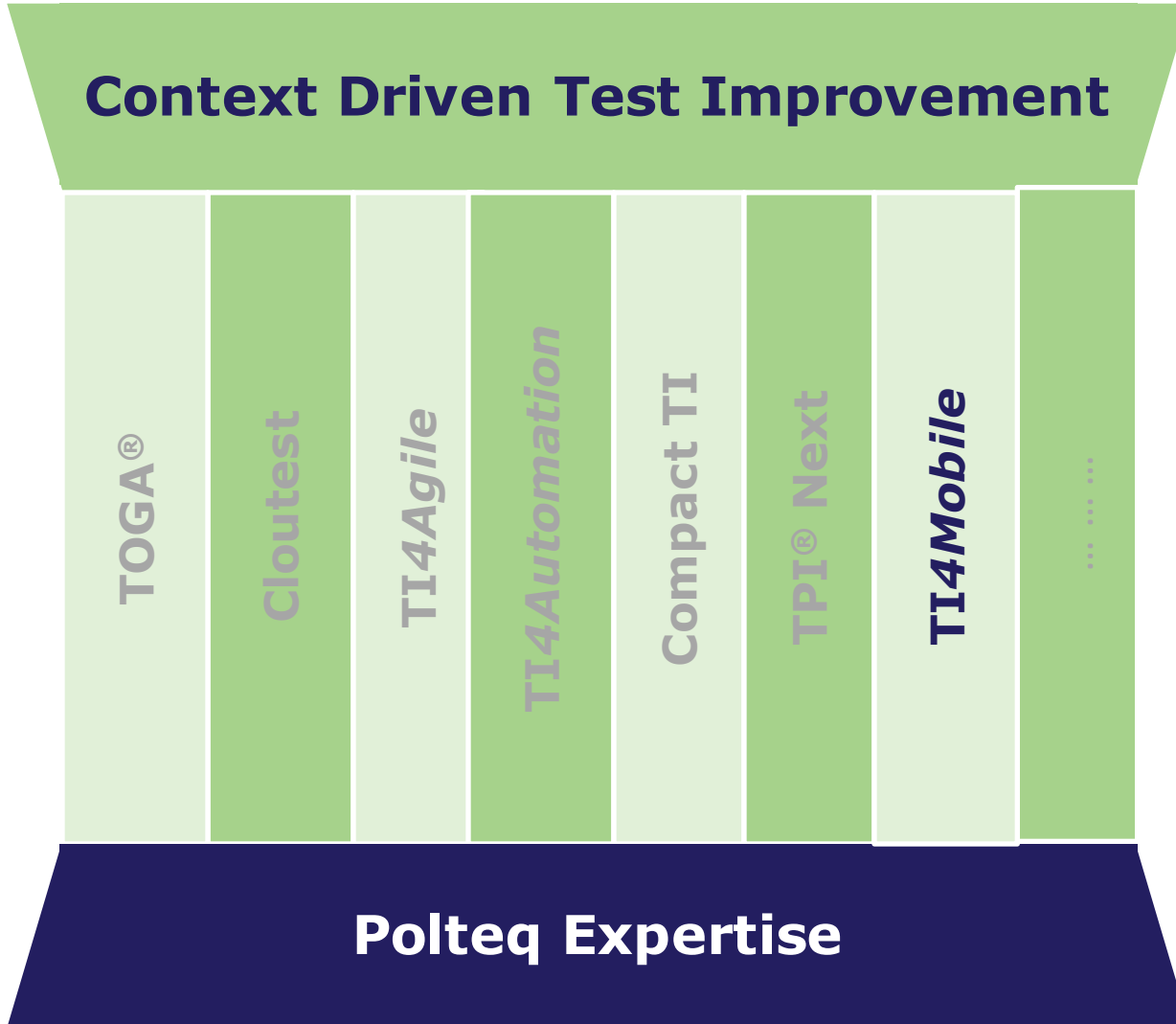
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Find the context for your improvement



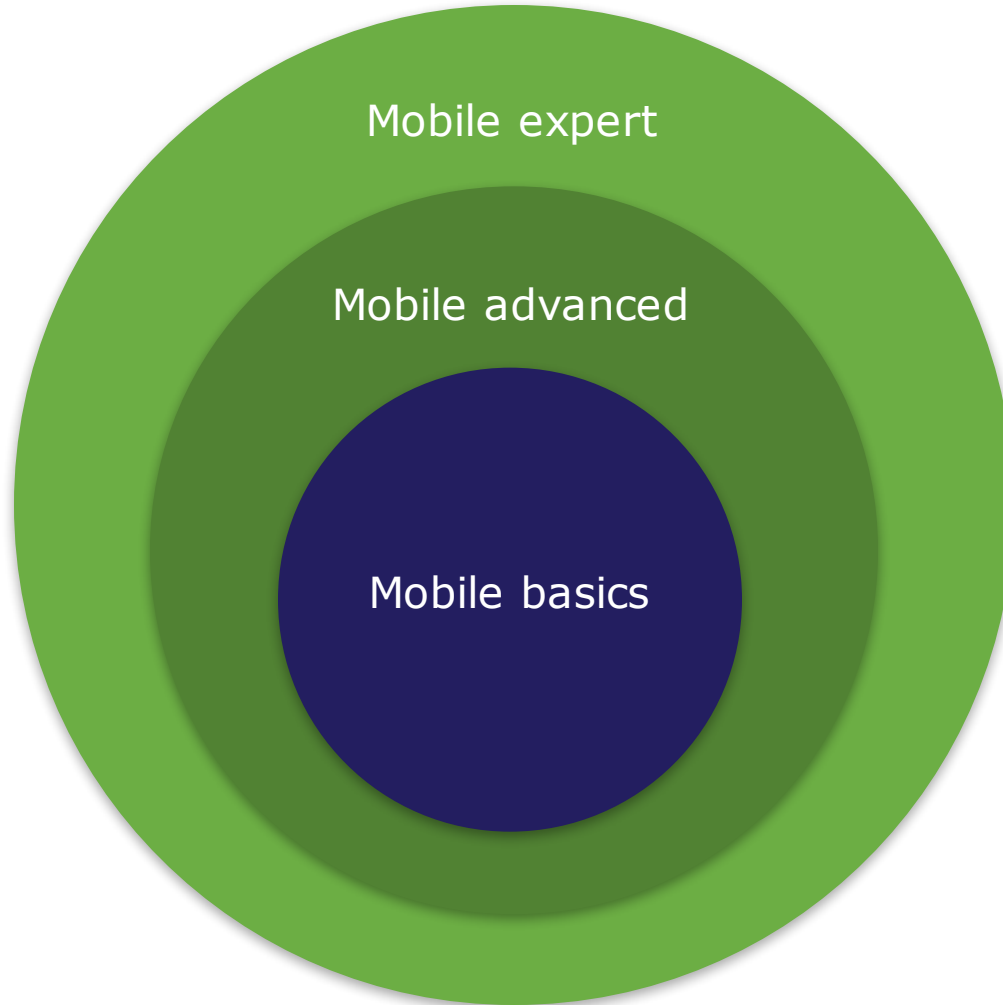
Find the context for your improvement



How aware is the organization of the mobile challenges?



TI4*Mobile* maturity levels

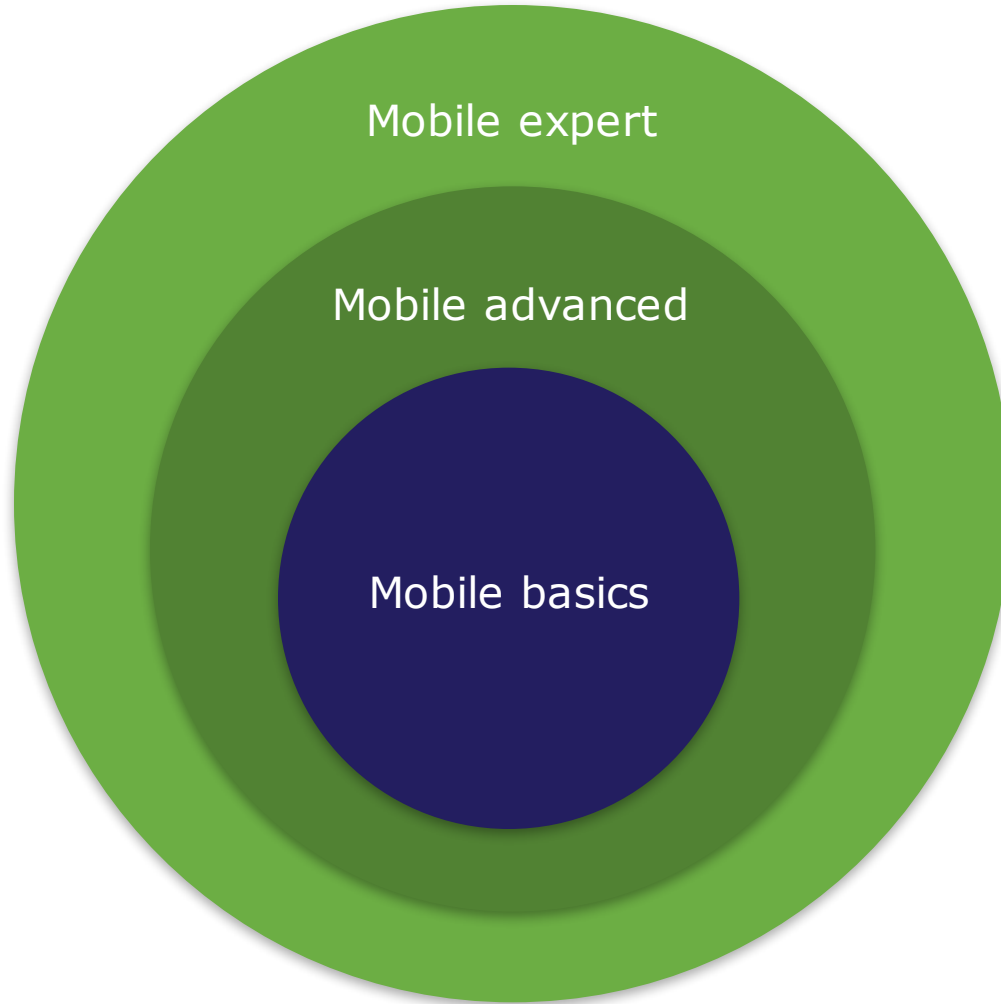


TI4*Mobile* maturity levels

Basics

Advanced

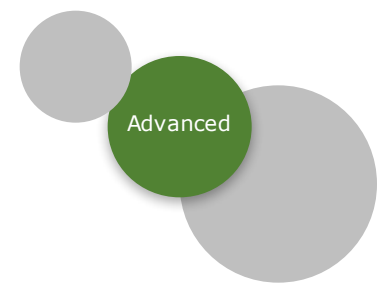
Expert



1st Level – Mobile basics

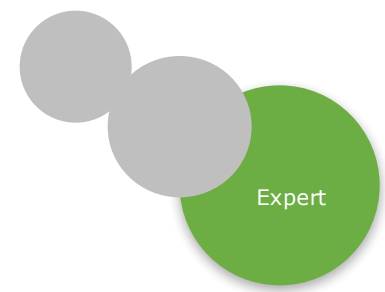
- The level of mobile awareness across the project, people within a team and organization. This is enabling the conditions that are required for mobile testing.
- **Mobile basics aspects**
 - Testability of the mobile app
 - Available testing skills
 - Mobile test environment
 - Usage of Analytics
 - API testing

2nd Level – Mobile advanced



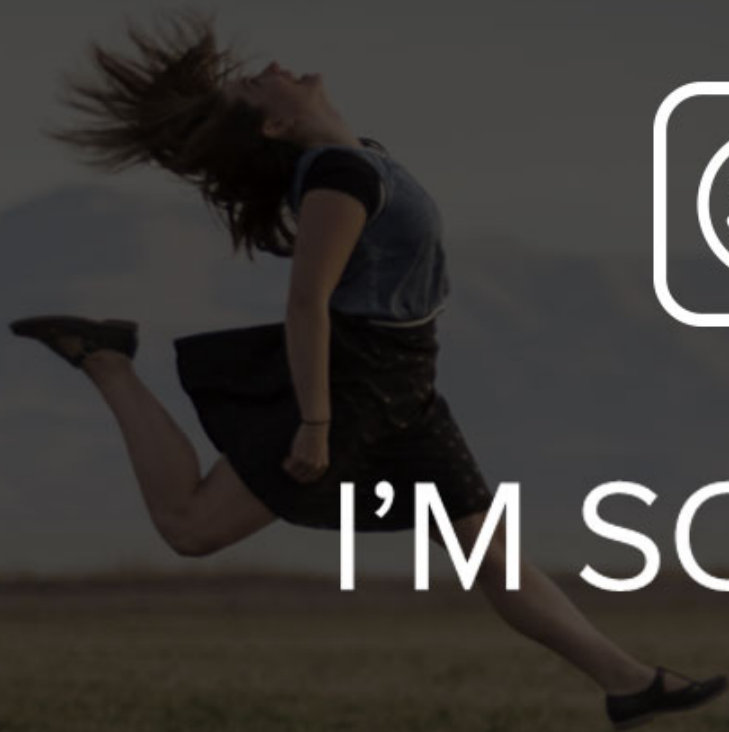
- All the mobile perspectives are understood and used to increase the effectiveness of the test process.
- **Mobile Advanced aspects**
 - Team shares mobile test knowledge
 - Mobile perspectives in the Product Risk Analysis
 - Dedicated test role in a co-located development team
 - Device lab for all types of tests
 - Development heartbeat corresponds to market demands
 - End-users are involved in the development cycle

3rd level – Mobile expert



- Testing is so organized that it is constant capable of giving a quality feedback from unit to end-user and from backend to app for all perspectives within hours
- **Mobile Expert aspects**
 - Multiple test layers (environments, architecture, users)
 - Regular updates of the 'device usage market analysis'
 - User sessions as integrated part of the development cycles
 - "Passion or innovation time" to incorporate trends

Key areas



I'M SO APPY

Key areas

- What would be the key areas in TI4*Mobile*?

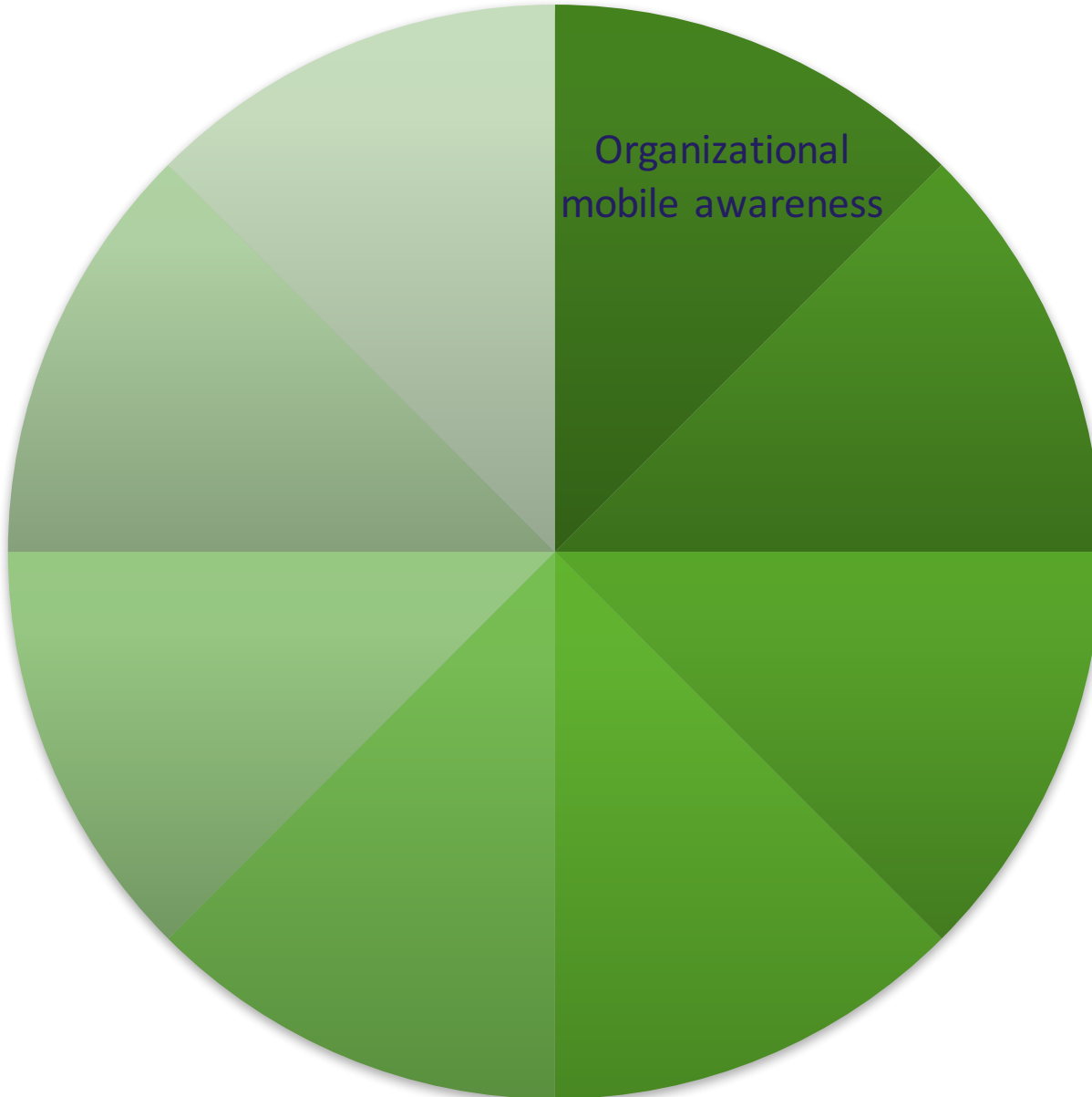


The key areas of TI4Mobile

Basics

Advanced

Expert

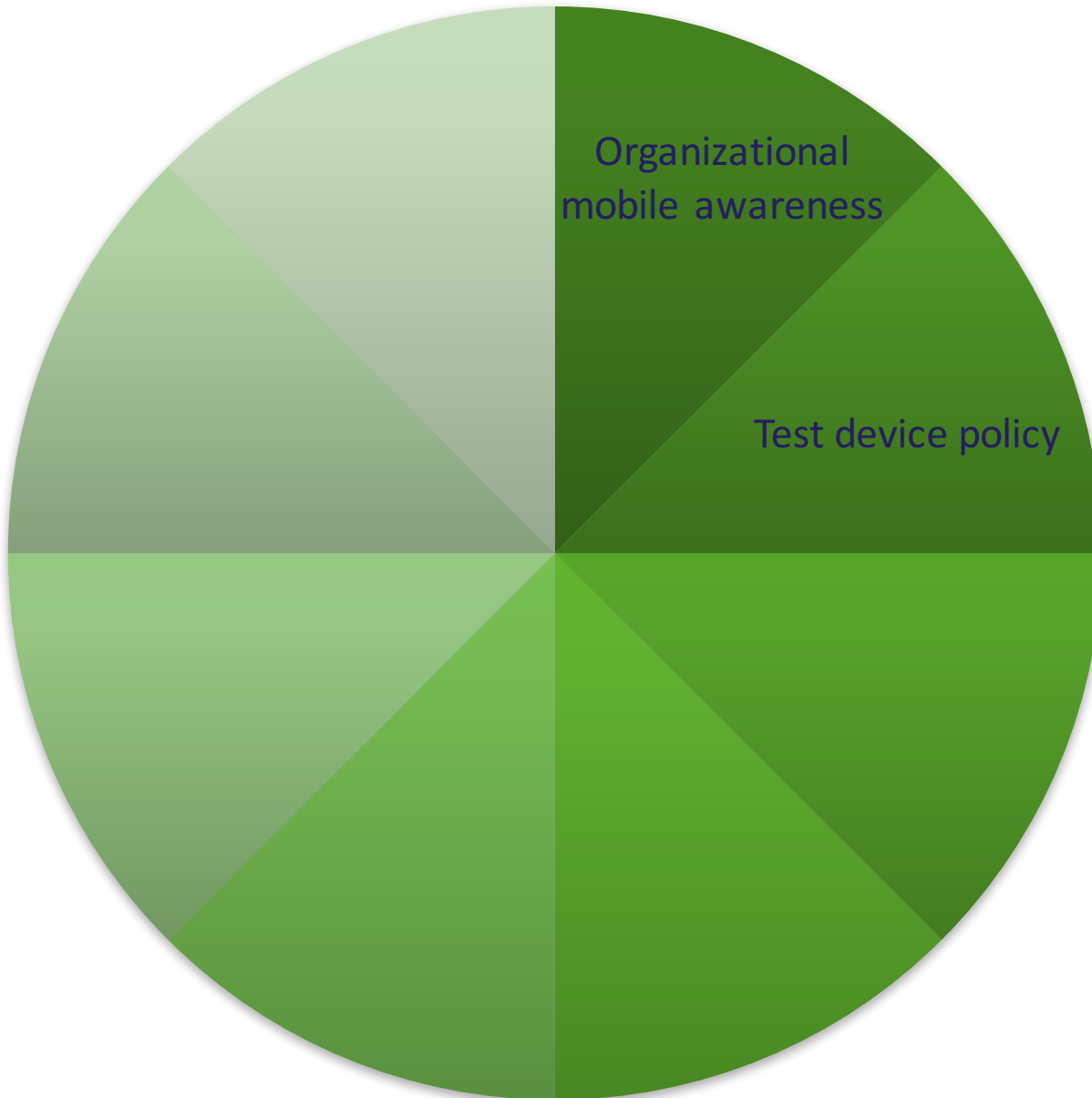


The key areas of TI4Mobile

Basics

Advanced

Expert

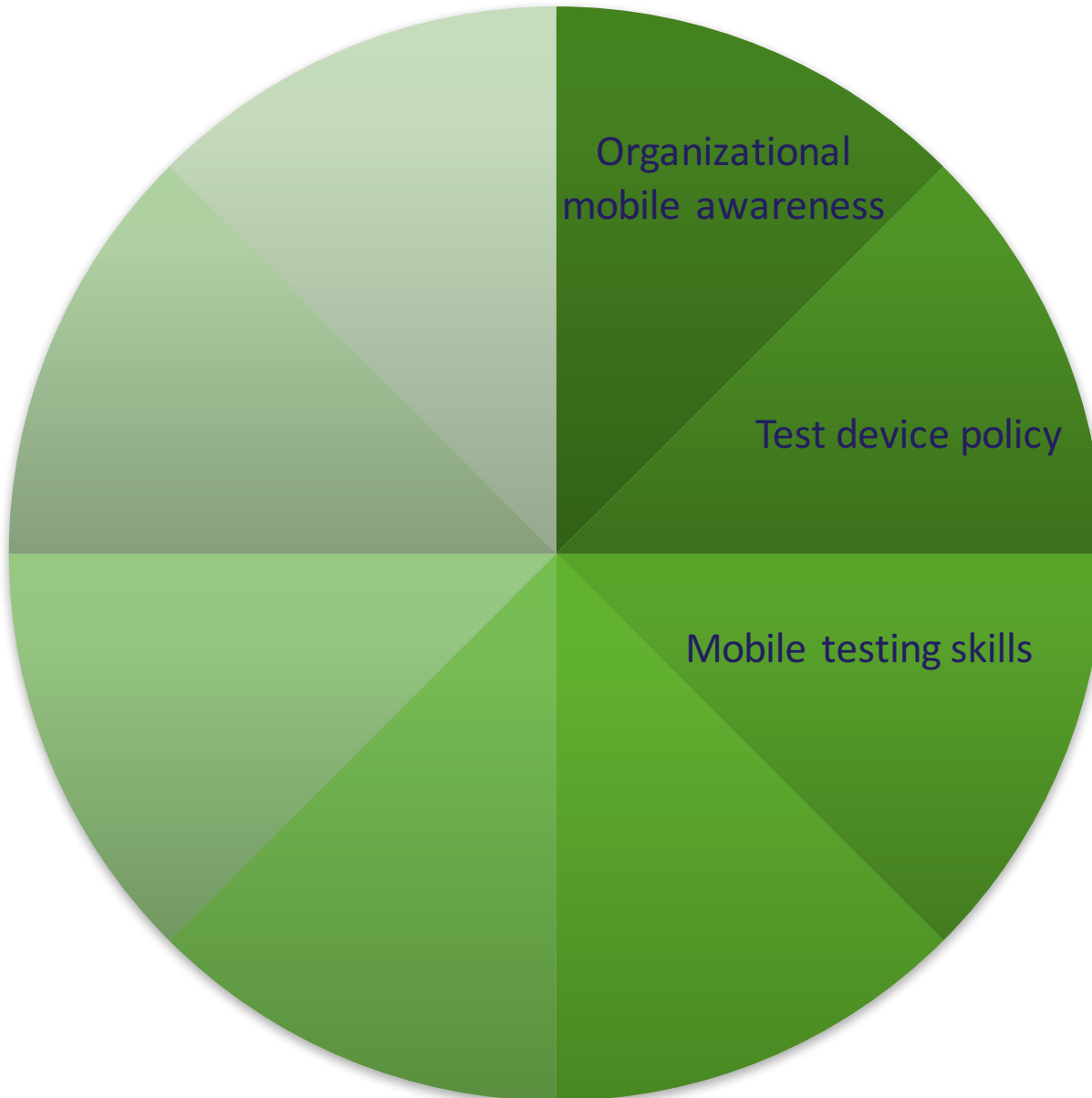


The key areas of TI4Mobile

Basics

Advanced

Expert

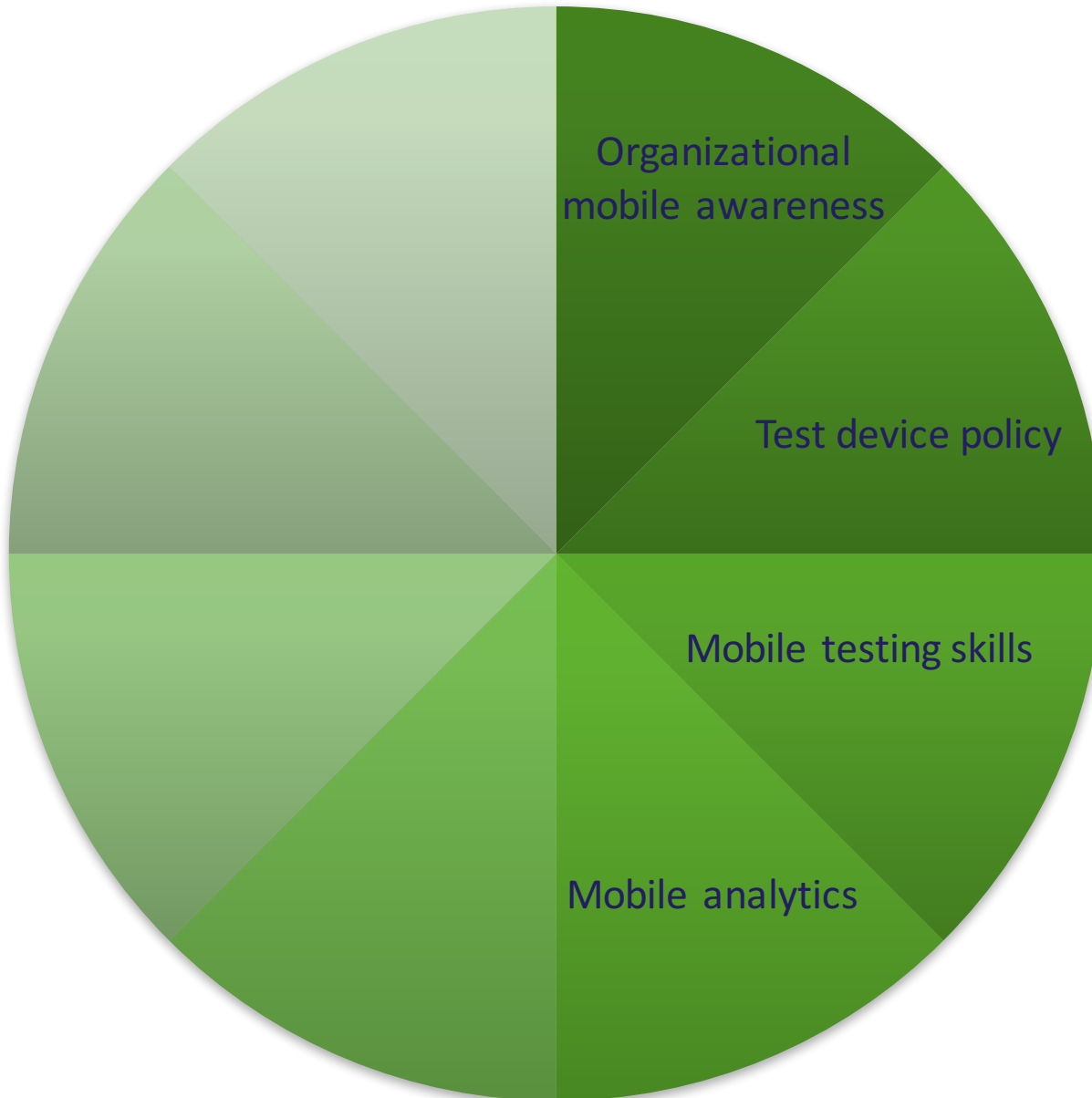


The key areas of TI4Mobile

Basics

Advanced

Expert

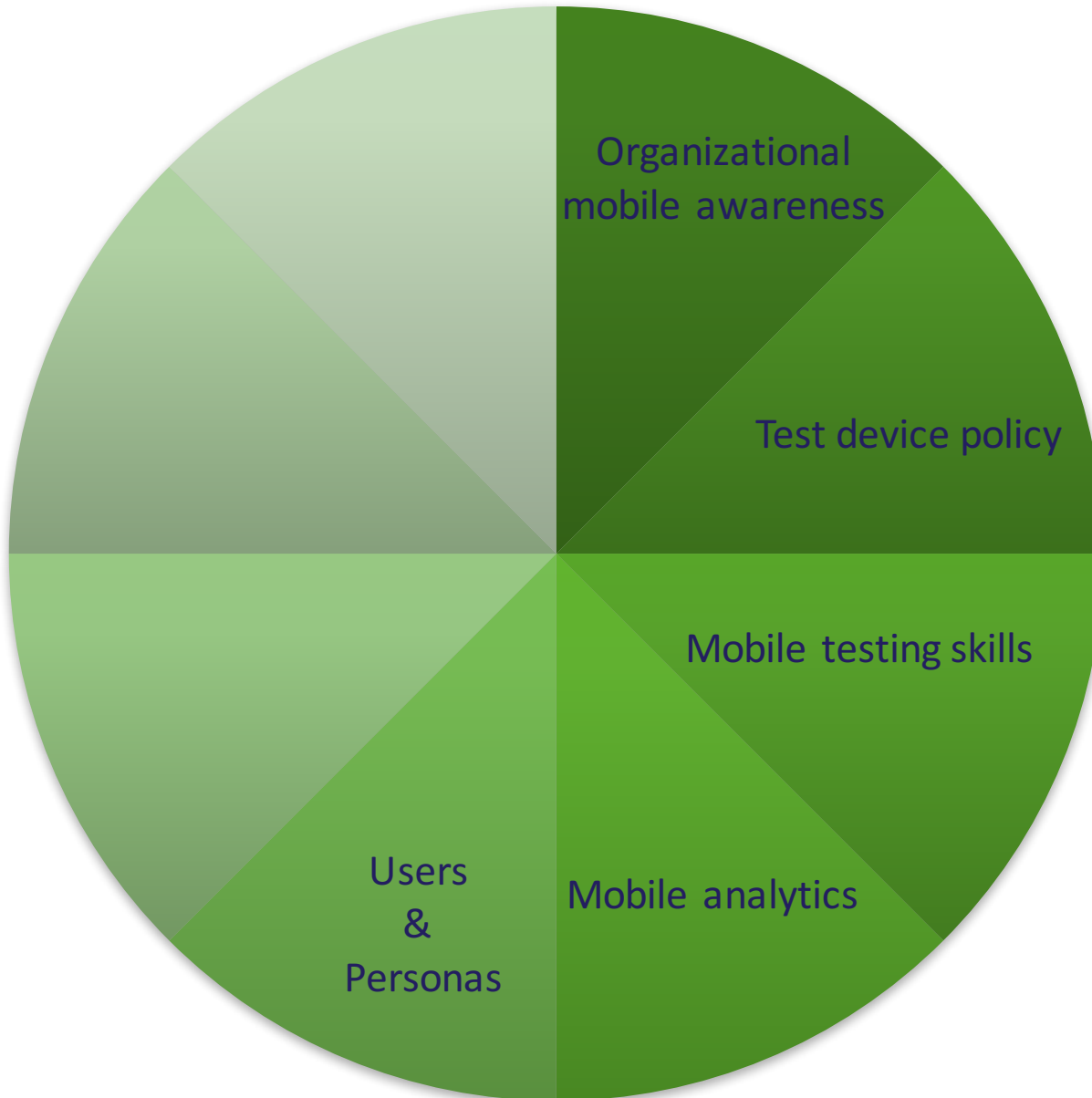


The key areas of TI4Mobile

Basics

Advanced

Expert

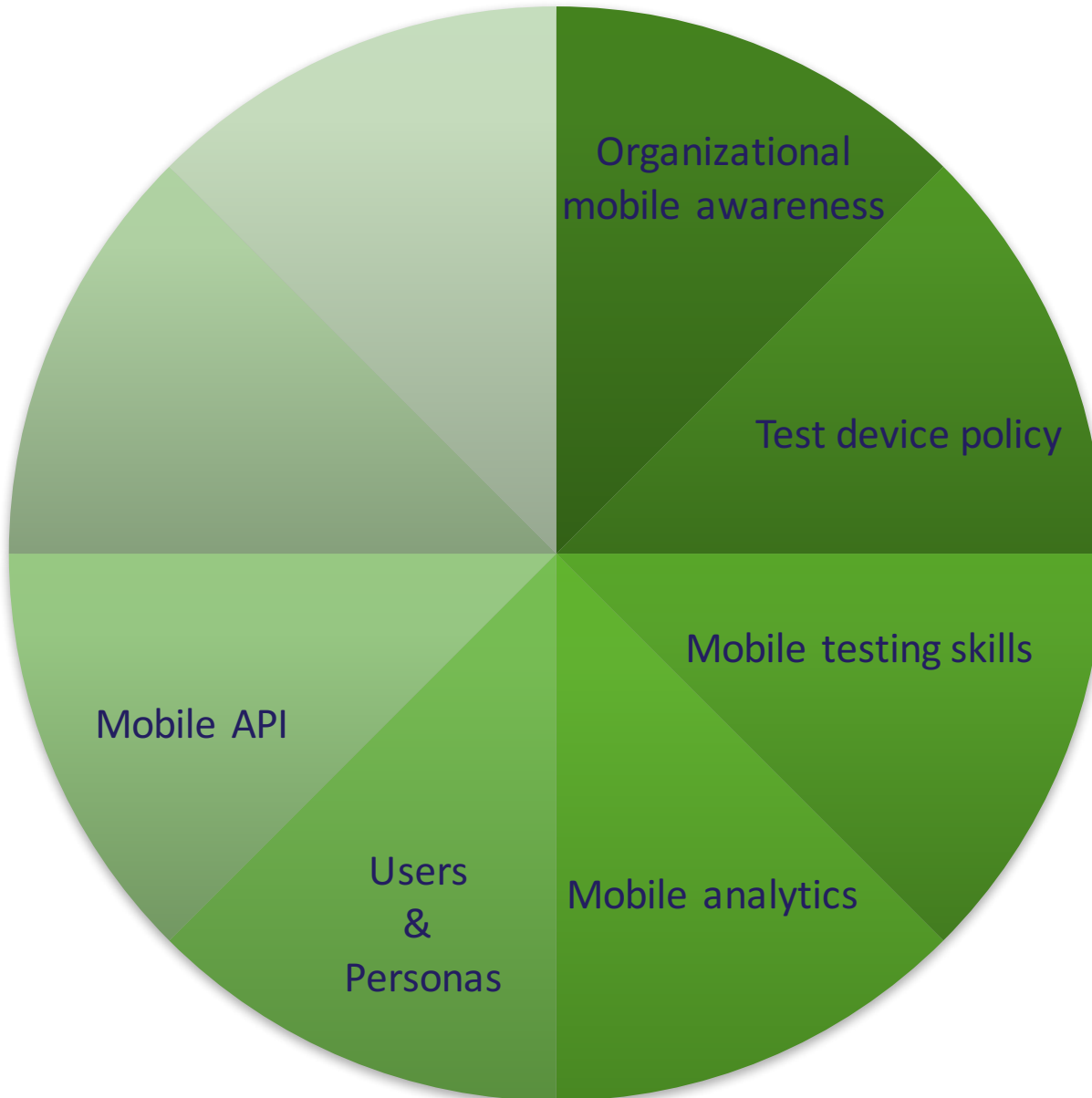


The key areas of TI4Mobile

Basics

Advanced

Expert

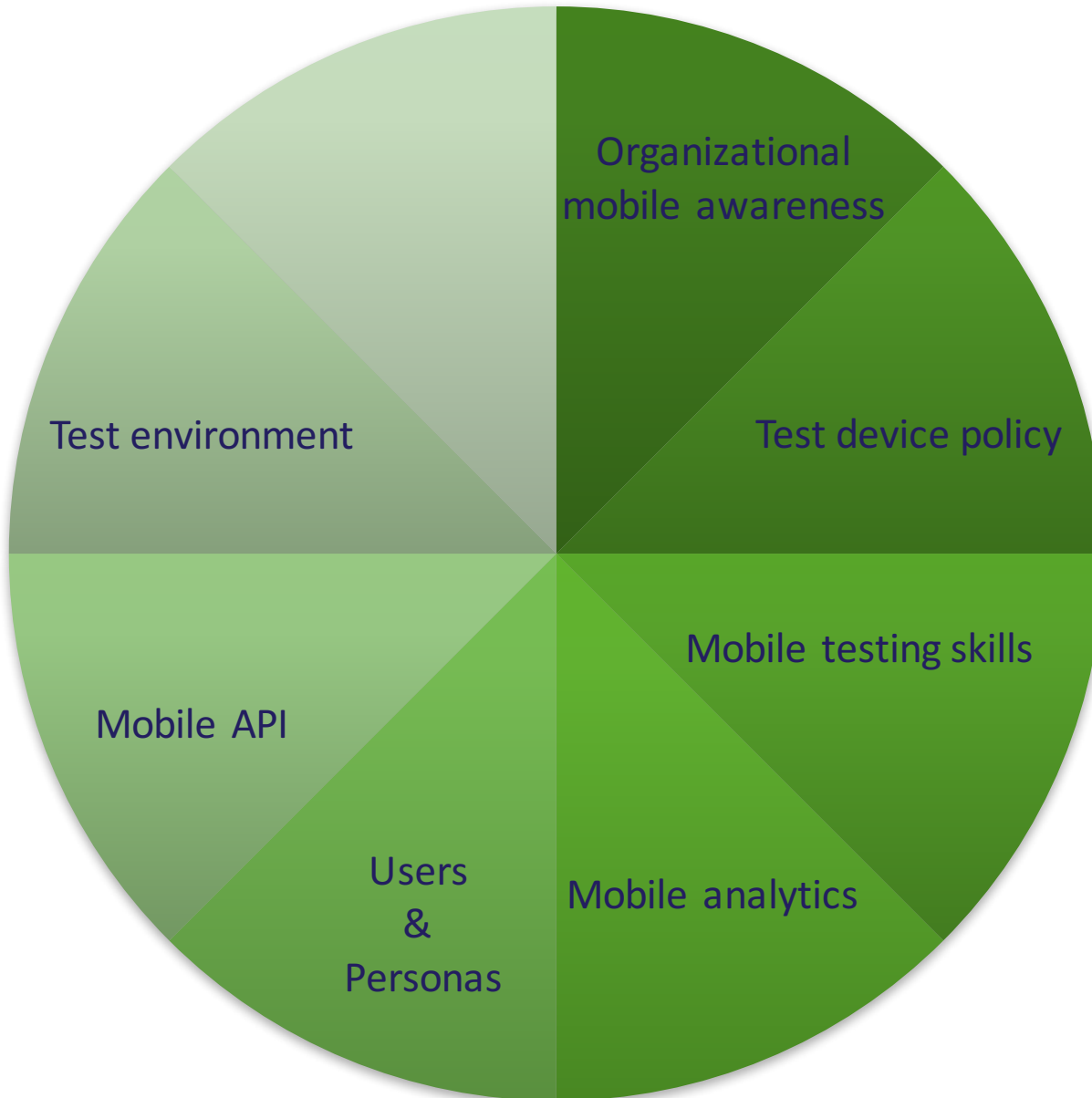


The key areas of TI4Mobile

Basics

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Expert

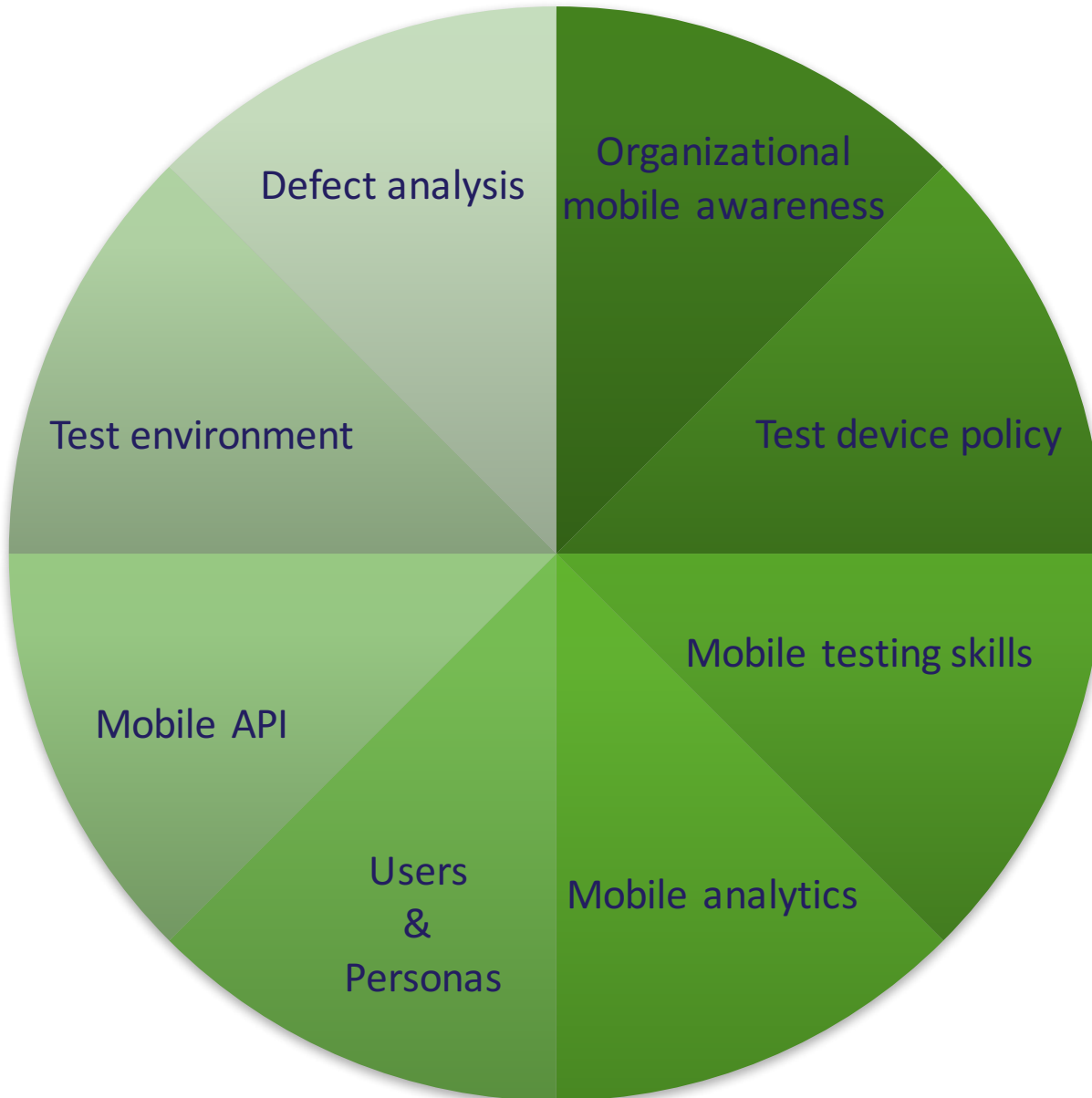


The key areas of TI4Mobile

Basics

Advanced

Expert



TI4Mobile key areas

Basics

Advanced

Expert

Key area

- | | |
|---|---------------------------------|
| 1 | Organizational mobile awareness |
| 2 | Device policy |
| 3 | Mobile testing skills |
| 4 | Mobile analytics |
| 5 | Users & personas |
| 6 | Mobile API |
| 7 | Test environment |
| 8 | Defect analysis |

TI4Mobile key areas

Basics

Advanced

Expert

Key area		Mobile basics
1	Organizational mobile awareness	
2	Device policy	
3	Mobile testing skills	
4	Mobile analytics	
5	Users & personas	
6	Mobile API	
7	Test environment	
8	Defect analysis	

TI4Mobile key areas

Basics

Advanced

Expert

Key area		Mobile basics			
1	Organizational mobile awareness	1	2	3	
2	Device policy	1	2	3	
3	Mobile testing skills	1	2	3	
4	Mobile analytics	1	2	3	
5	Users & personas	1	2	3	
6	Mobile API	1	2	3	4
7	Test environment	1	2	3	
8	Defect analysis	1	2	3	

TI4Mobile key areas

Basics

Advanced

Expert

Key area		Mobile basics				Mobile advanced		
1	Organizational mobile awareness	1	2	3	1	2	3	
2	Device policy	1	2	3	1	2	3	
3	Mobile testing skills	1	2	3	1	2	3	
4	Mobile analytics	1	2	3	1	2	3	
5	Users & personas	1	2	3	1	2	3	
6	Mobile API	1	2	3	4	1	2	3
7	Test environment	1	2	3	1	2	3	
8	Defect analysis	1	2	3	1	2	3	

TI4Mobile key areas

Basics

Advanced

Expert

Key area		Mobile basics			Mobile advanced			Mobile expert			
1	Organizational mobile awareness	1	2	3	1	2	3	1	2	3	
2	Device policy	1	2	3	1	2	3	1	2	3	
3	Mobile testing skills	1	2	3	1	2	3	1	2	3	
4	Mobile analytics	1	2	3	1	2	3	1	2	3	
5	Users & personas	1	2	3	1	2	3	1	2	3	
6	Mobile API	1	2	3	4	1	2	3	1	2	3
7	Test environment	1	2	3	1	2	3	1	2	3	
8	Defect analysis	1	2	3	1	2	3	1	2	3	4

Case 2: Look for key-area's

Hand out

- Same groups
- Find key areas in the case

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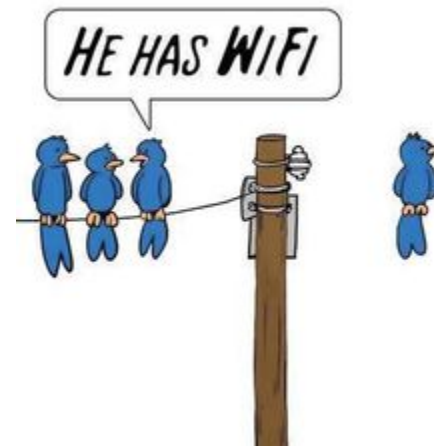
TI4Mobile key areas

Basics

Advanced

Expert

- Organizational mobile awareness
- Device policy
- Mobile testing skills
- Mobile analytics
- Users & Personas
- Mobile API
- Test environment
- Defect analysis



Example assessment

Hand out

Key area		Mobile basics			Mobile advanced			Mobile expert			
1	Organizational mobile awareness	1	2	3	1	2	3	1	2	3	
2	Device policy	1	2	3	1	2	3	1	2	3	
3	Mobile testing skills	1	2	3	1	2	3	1	2	3	
4	Mobile analytics	1	2	3	1	2	3	1	2	3	
5	Users & personas	1	2	3	1	2	3	1	2	3	
6	Mobile API	1	2	3	4	1	2	3	1	2	3
7	Test environment	1	2	3	1	2	3	1	2	3	
8	Defect analysis	1	2	3	1	2	3	1	2	3	4

Organizational mobile awareness

Basics

Advanced

Expert

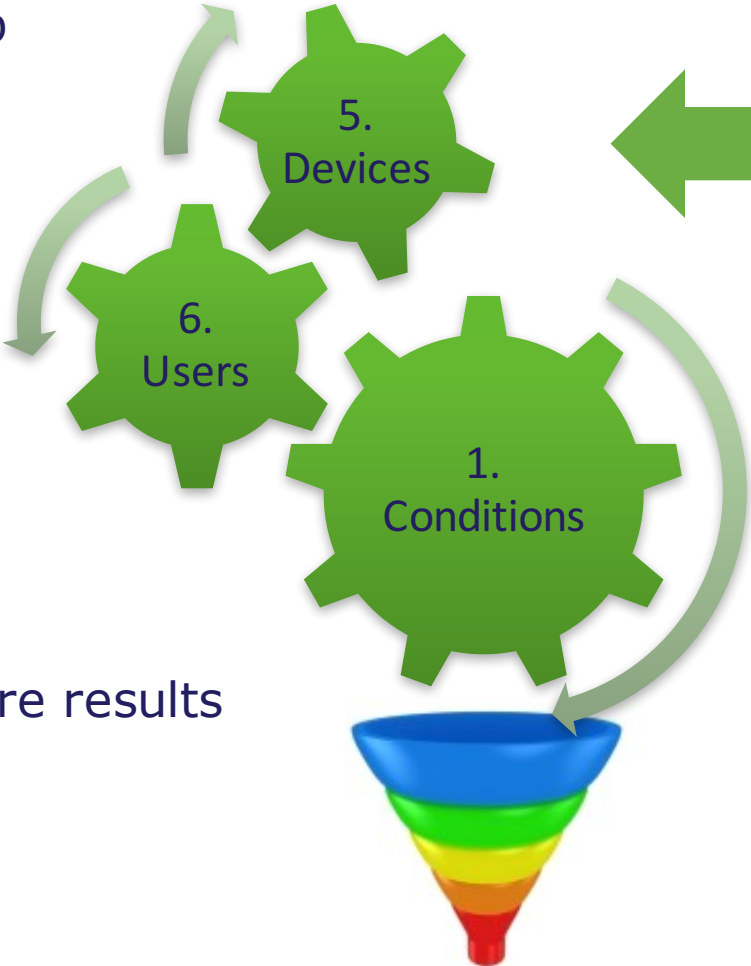
- **Definition**

The mobile app test process is supported by a mobile aware organization that understands e.g. testability of the app, fast response time and short time to market

Organizational mobile awareness – Test approach

3. Test plan

7. Test lab



4. Test cases



2. User / Tester

8. Capture results

9. Analyze results

10. Reporting test results

Organizational mobile awareness

Basics

Advanced

Expert

Mobile basics

1. Mobile test knowledge is gathered and shared in the team.
2. There is a mobile app test policy.
3. The organization has requirements for the testability of the app.

Mobile advanced

1. Testing collaborates with other disciplines in the development process.
2. There is an aligned heart beat in the organization that is fast enough to respond to market demands.
3. There is a strategy to test on multiple layers to achieve proper coverage and detect regression.

Mobile expert

1. Passion time is dedicated to keep up with trends and new developments.
2. The organization continuously strives to improve the test process to be competitive in the changing market of mobile apps.
3. Mobile app testing is part of the continuous integration.

Case 3: Maturity level

Hand out

- Same groups
- Determine maturity level for the key area with given checkpoints

Test device policy

Basics

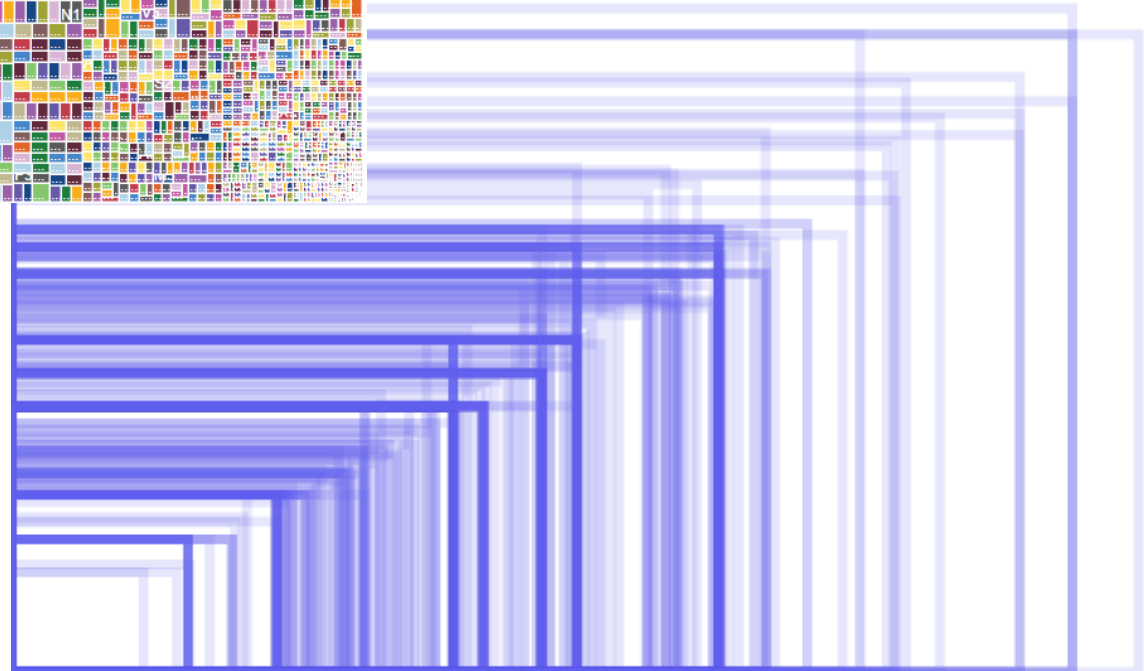
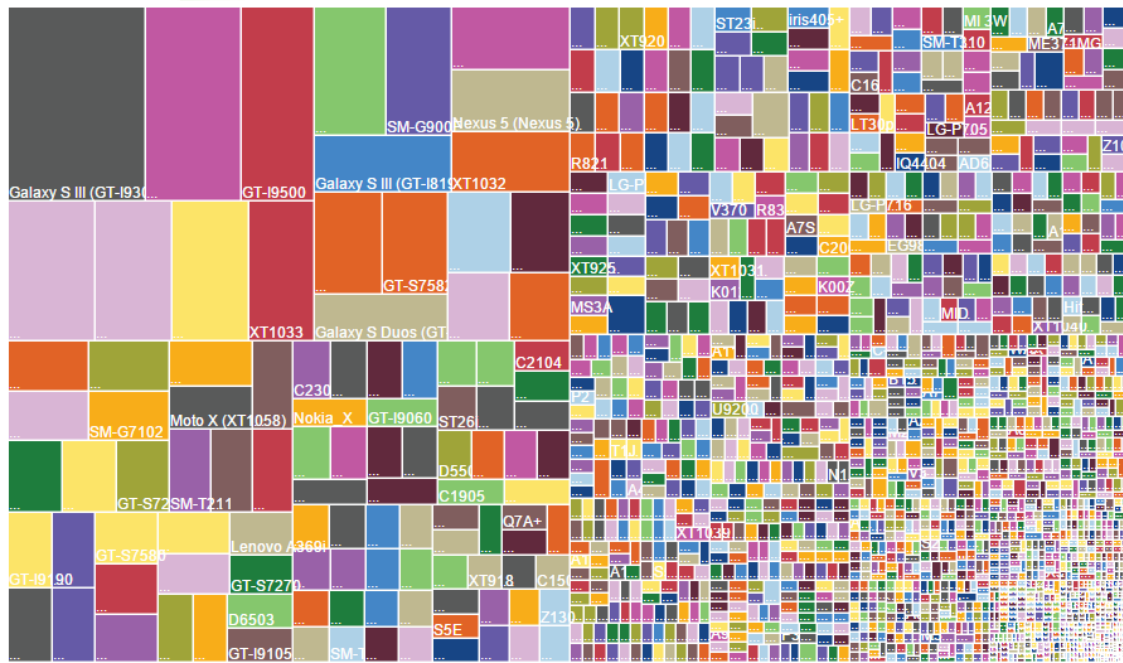
Advanced

Expert

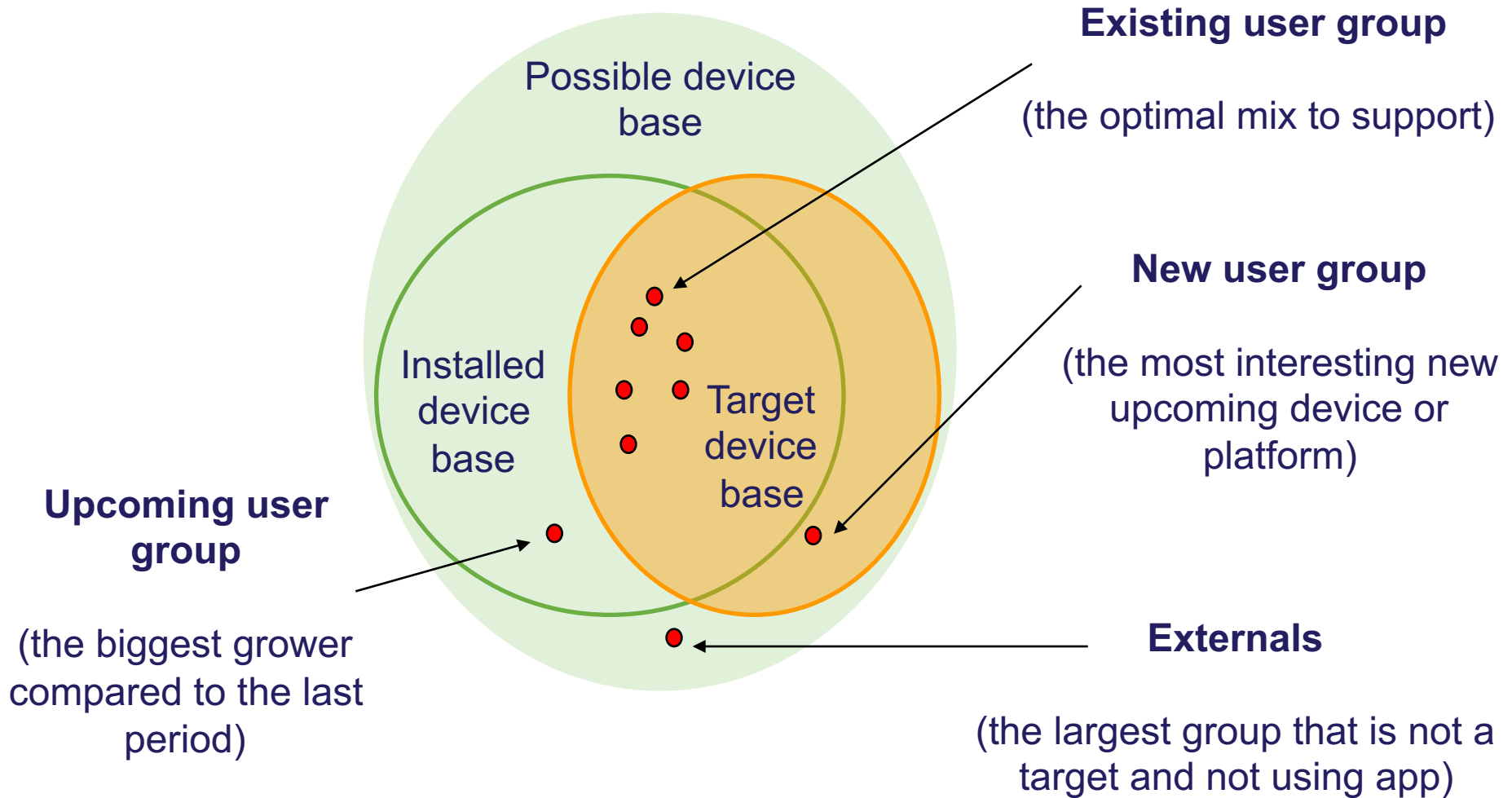
- **Definition**

To test with a proper device set for your target audience, a policy needs to be defined

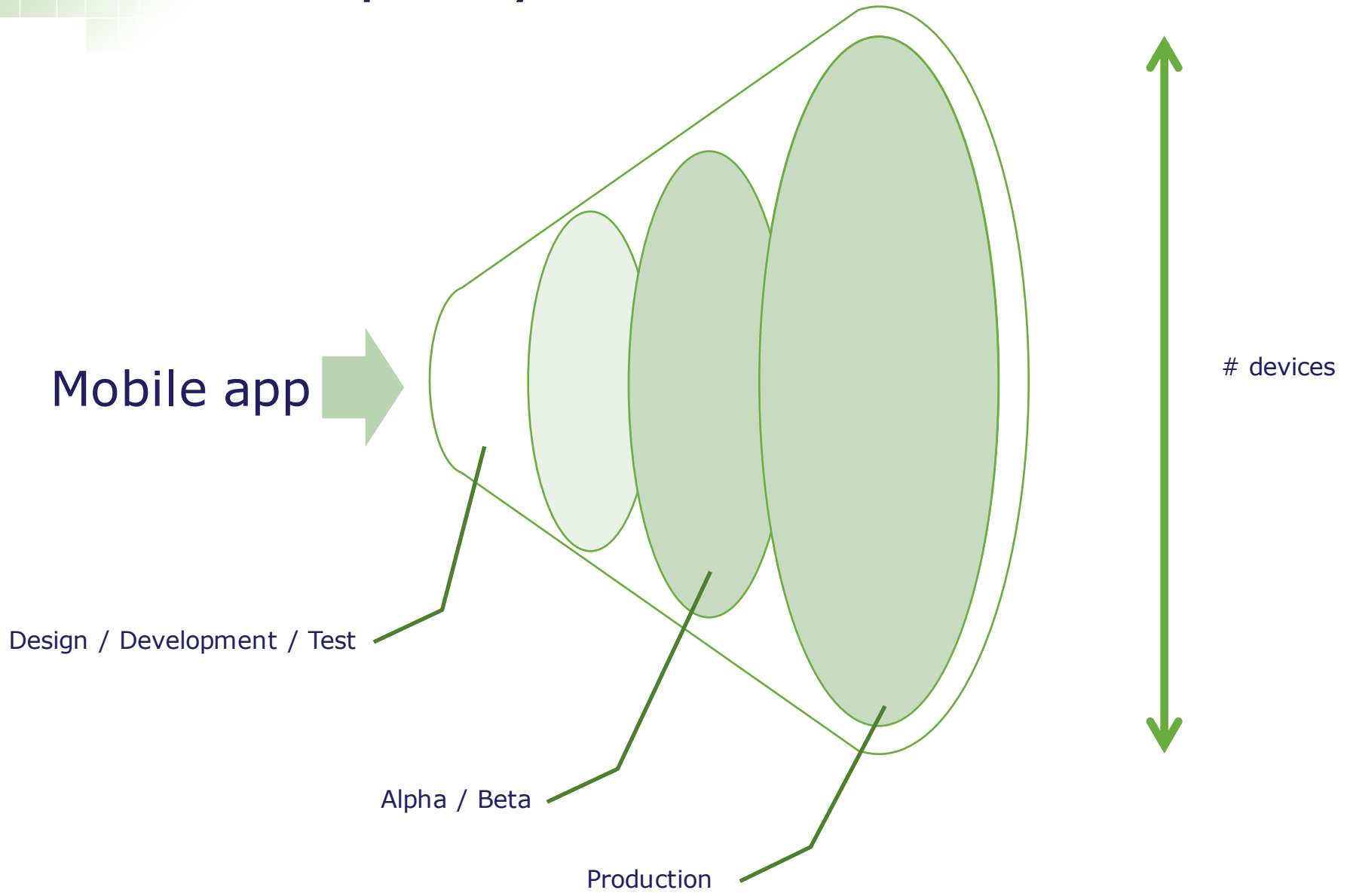
Test device policy – Device analysis



Test device policy – Device analysis



Test device policy – Tasks in the SDLC



Test device policy

Basics

Advanced

Expert

Mobile basics

1. Physical devices are used in testing in an ad hoc manor.
2. Emulators and simulators are used for testing new OS releases.
3. A budget for test devices is provided by the organization.

Mobile advanced

1. Analytics (App store and Market analysis) are performed to narrow down choices in device selection.
2. A Cloud lab is available for devices that are not physically present.
3. The device lab is designed so that it can be used for multiple types of tests.

Mobile expert

1. The market is analyzed periodically in order to update the test lab.
2. There is a policy for updating the software on the devices to make educated decisions.
3. (beta) user devices are used for robustness testing.

Case 3: Maturity level

Hand out

- Same groups
- Determine maturity level for the key area with given checkpoints

Mobile testing skills

Basics

Advanced

Expert

- **Definition**

Skills and knowledge like perspectives and heuristics to facilitating efficient and effective testing of mobile apps

Mobile testing skills – a mobile app tester

- Knowing your device(s)
 - Capabilities of a device (what is possible?)
 - Master the touch screen and sensors
 - Use device guidelines and reviews
 - Explore (many) physical devices
- Knowing the (type of) app that is going to be tested
 - Install variants of an app and try it out
 - Explore an app in real environment conditions
- Knowing the domain (glossary of the mobile world)

Mobile testing skills – Test cases and variation

- Variation is achieved by spreading devices across test cases using a “Classification tree”.
- Vary:
 - Test every epic using different perspectives (PRA)
 - Users
 - Devices, Operating Systems
 - Platforms and versions
 - Network types and quality
 - Movement

Mobile testing skills – Perspectives

- Input
- Store submission
- Location services
- Interactions/interruptions
- Communication
- Ergonomic
- Data
- Usability
- Platform
- Function
- User scenarios
- Network conditions



I SLICED UP FUN mobiel app perspectieven model van Jonathan Kohl

Mobile testing skills – Test cases (tours)

- A tour is a directed search through the app
- A tour is a class within exploratory testing technique
- Direct means a more structured approach
- A tour describes how you are going test, with which focus

- Each tour contains:
 - Purpose of the tour
 - Tasks
 - Test environment(conditions)
 - Test devices
 - User (who is using this app?)
 - Reporting

* Cem Kaner, <http://kaner.com/?p=96>



Mobile testing skills

Basics

Advanced

Expert

Mobile basics

1. The mobile app tester is well trained and/or has experienced in testing mobile apps.
2. Different mobile perspectives are captured in test preparation.
3. The app tester understands and uses tools during testing the app.

Mobile advanced

1. Experience based techniques are applied.
2. The app tester is involved with reviewing process.
3. The tester can perform root cause analysis.

Mobile expert

1. Feedback from end-users perspective is considered to improve the test process.
2. There is a mobile testing training program to constantly update experience and knowledge.
3. The app tester shares the mobile app test knowledge pro-actively in the team.

Case 3: Maturity level

Hand out

- Same groups
- Determine maturity level for the key area with given checkpoints

Mobile analytics

Basics

Advanced

Expert

- **Definition**

Defining, collecting and managing meaningful patterns in analytics to improve mobile testing



Mobile analytics

Basics

Advanced

Expert

Mobile basics

1. There is clear purpose on gathering analytics.
2. There is a platform implemented to collect analytics.
3. Test is involved in the analytics process.

Mobile advanced

1. A device market analysis is performed to get insight in app's and user's behavior.
2. Test results are compared with the analytics results.
3. The results of analytics help prioritise all test activities.

Mobile expert

1. The collection of analytis is tested, adapted and optimized.
2. There is an evaluation on the data to information process.
3. The way analytics is used during testing, is updated and improved.

Case 3: Maturity level

Hand out

- Same groups
- Determine maturity level for the key area with given checkpoints

Users & Personas

Basics

Advanced

Expert

- **Definition**

End-user has a high level of involvement in the test process. End-user view can be encapsulated in a character or persona

Users & Personas

Example

Fine example of a real user



Users & Personas

- Personas represent a part of your user group
- Their behavior and usage of the app is described in personas. They are fictional users based on your user group.

Users & Personas – Basics

Example

The app user is a man, middle age that likes to share his experience with animals by writing blogs with photo's

Users & Personas - Advanced

Example

The app user is Harold, a man of 50 years and has a part-time job in the local supermarket. He has four cats and writes a blog about his experience in caring for animals. Harold loves taking pictures and shares them on his blog. He has an iPad and uses it on his local WiFi.



Users & Personas - Expert

Example

I write about cats

Harold (50)

Wants more interaction via the blog

I like to add more pictures



Works part-time in the supermarket



Impatient



Is lonely sometimes

Uses his iPad a lot during the day from home on his local WiFi

Loves photography

Cares about animals

Users & Personas

Basics

Advanced

Expert

Mobile basics

1. A user profile is made based on the (expected) group of users.
2. Testing is done by the internal (project) organisation like testers, developers, stakeholders.
3. The end-user perspective is considered important.

Mobile advanced

1. Mobile personas are created.
2. Personas are based on analytics of the end-user.
3. Personas are applied into the user stories, test cases and test execution.

Mobile expert

1. Personas are regularly reviewed and updated based on feedback from the end-user.
2. There is a (beta) user community that performs tests on new releases in their context and on their devices.
3. Users are regularly involved during all test activities.

Case 3: Maturity level

Hand out

- Same groups
- Determine maturity level for the key area with given checkpoints

Mobile API

Basics

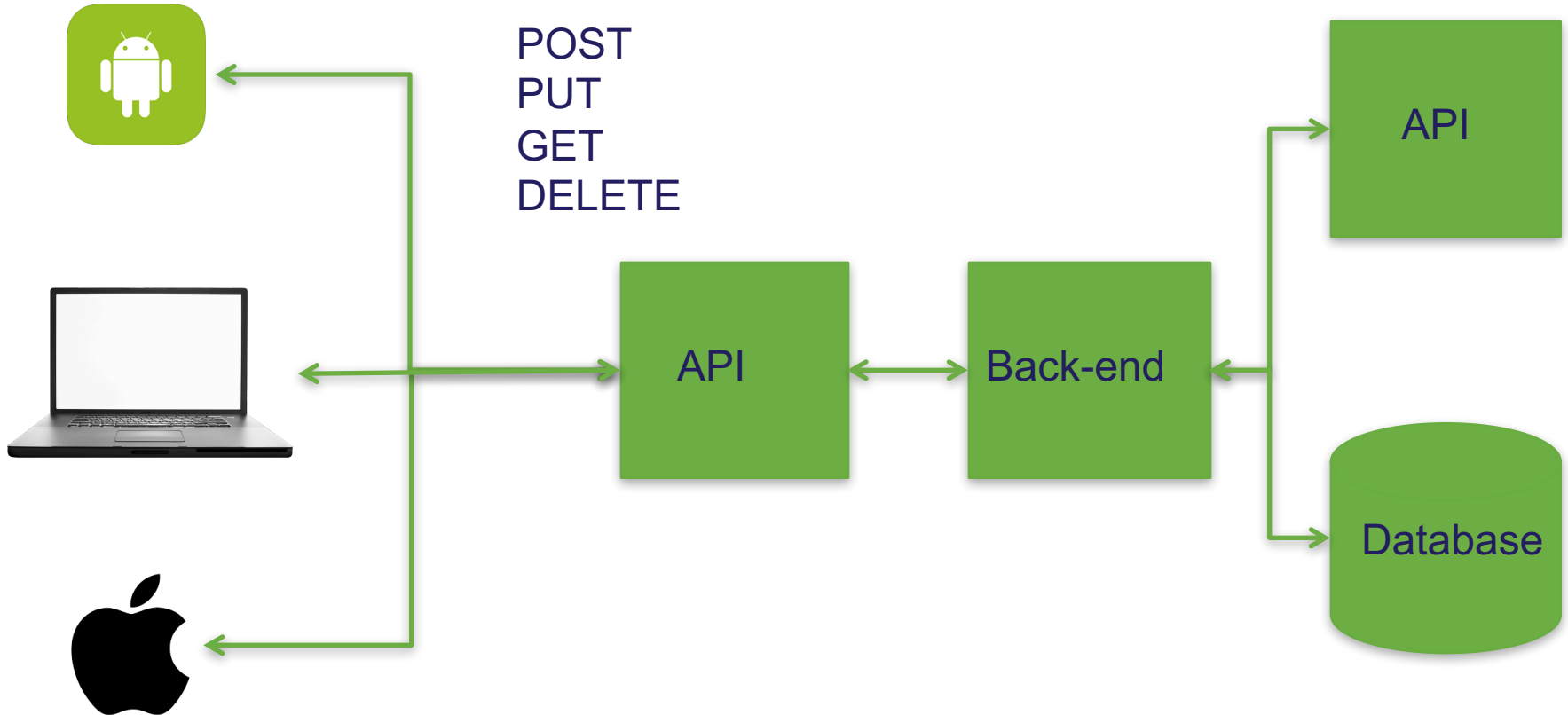
Advanced

Expert

- **Definition**

Mobile API testing is an integral part of the test process, including agreements about responsibility and documentation

Mobile API – Testing the API



Mobile API – Testing the API

The screenshot displays the Postman Builder interface for testing an API endpoint. The main window shows a GET request to `https://echo.getpostman.com/get`. The **Tests** tab is active, showing the following test script:

```
1 tests["Status code is 200"] = responsiveCode.code === 200;
2 tests["Response time is less than 400ms"] = responseTime < 400;
3
4
5 var jsonData = JSON.parse(responseBody);
6 tests["Sent from a Mac"] = jsonData.headers["user-agent"].indexOf("Mac OS") > -1;
7
8
9
10
11
12
13
14
```

The test results are displayed below the script:

- PASS** Status code is 200
- FAIL** Response time is less than 400ms
- PASS** Sent from a Mac

The interface also shows a sidebar with collections, a top navigation bar with 'Runner', 'Import', and 'Builder' tabs, and a right sidebar with 'SNIPPETS' and 'Generate Code' options. The status bar at the bottom indicates 'Status 200 OK' and 'Time 500 ms'.

Mobile basics

1. The API is tested before release.
2. The API is tested headless.
3. It is requested that the mobile API is tested.
4. The API is documented.

Mobile advanced

1. The team has clear arrangements about responsibilities, points of contact and sharing API's.
2. Non functionals are input for testing API's.
3. The process for releasing the Mobile API is defined.

Mobile expert

1. API's are covered and monitored in testing the end-to-end chain.
2. Automated API testing is integrated with the continuous integration.
3. API usage statistics are gathered and used to improve functional and non-functional testing.

Case 3: Maturity level

Hand out

- Same groups
- Determine maturity level for the key area with given checkpoints

Test environment

Basics

Advanced

Expert

- **Definition**

An environment with production like data variations, settings, conditions and infrastructure to perform tests for a robust mobile app



Test environment

Basics

Advanced

Expert

Mobile basics

1. The Mobile app environment can be isolated with a stub and driver framework.
2. An app can be deployed to the test environment.
3. There is a test environment connected to the backend systems.

Mobile advanced

1. There are different environments for different types of tests.
2. An app can be deployed to every environment.
3. Mobile specific conditions are considered and enabled for a representative test environment.

Mobile expert

1. It is possible to push a new version of the app to the (beta) user group.
2. It is possible to test in production.
3. A usability lab is used to test the app in the suitable environment.

Case 3: Maturity level

Hand out

- Same groups
- Determine maturity level for the key area with given checkpoints

Defect analysis

Basics

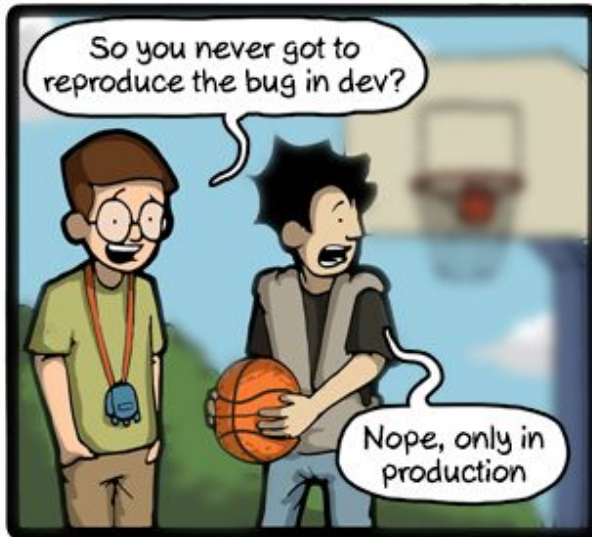
Advanced

Expert

- **Definition**

Mobile defects originate often from a combination of multiple factors. Analysis is needed to find deviation between factors like devices, perspectives, conditions and users

Reproducing defects



Defect analysis

Mobile basics

1. The defect tooling supports logging of external/mobile conditions.
2. The tester adds logging to defects.
3. Tools to prove/reproduce a defect are used

Mobile advanced

1. Different app versions of the system under test can be used to compare app behavior.
2. Mobile specific conditions are logged together with the defect to enable easy reproduction.
3. Different environments can be used to compare app behavior and to determine the defect cause

Mobile expert

1. Defects are analysed to discover trends in weak points of the app.
2. Production is monitored to quickly respond to issues.
3. Defect fixes are validated by users from the beta group.
4. Issues from production flow (registered) directly back to the development team for defect analysis.

Case 3: Maturity level

Hand out

- Same groups
- Determine maturity level for the key area with given checkpoints

Example assessment

Basics

Advanced

Expert

Key area		Mobile basics			Mobile advanced			Mobile expert			
1	Organizational mobile awareness	1	2	3	1	2	3	1	2	3	
2	Device policy	1	2	3	1	2	3	1	2	3	
3	Mobile testing skills	1	2	3	1	2	3	1	2	3	
4	Mobile analytics	1	2	3	1	2	3	1	2	3	
5	Users & personas	1	2	3	1	2	3	1	2	3	
6	Mobile API	1	2	3	4	1	2	3	1	2	3
7	Test environment	1	2	3	1	2	3	1	2	3	
8	Defect analysis	1	2	3	1	2	3	1	2	3	4

Short term targets

Basics

Advanced

Expert

Key area		Mobile basics			Mobile advanced			Mobile expert			
1	Organizational mobile awareness	1	2	3	1	2	3	1	2	3	
2	Device policy	1	2	3	1	2	3	1	2	3	
3	Mobile testing skills	1	2	3	1	2	3	1	2	3	
4	Mobile analytics	1	2	3	1	2	3	1	2	3	
5	Users & personas	1	2	3	1	2	3	1	2	3	
6	Mobile API	1	2	3	4	1	2	3	1	2	3
7	Test environment	1	2	3	1	2	3	1	2	3	
8	Defect analysis	1	2	3	1	2	3	1	2	3	4

Enough talk, get to work!



Case 4: Improvement suggestions

Hand out

- Same groups
- Write down improvement suggestions for the assigned key areas.

Case 5: Present improvements

Hand out

- Same groups
- Present improvement suggestions for your assigned key areas



Content

1. Introduction
2. What's so different about mobile app testing?
3. Introduction to test improvement
4. The improvement model *TI4Mobile*
5. Key areas
 - Levels
 - Checkpoints
 - Good practices
6. *Wrap up*

Wrap up

1. Roadmap for test improvement
 1. Assessment
 2. Reference model
 3. TI4mobile, with mobile key areas
2. How to do a TI4mobile assessment
 1. Interview
 2. Analyse
 3. Map checkpoints
 4. Set goals, gap analysis
 5. Improvement suggestions

Questions?



More information

- <https://improvement.polteq.com/en/ti4mobile/>
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