

# UI test automation for mobile platforms

*Challenges and opportunities*

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# Agenda

- ▶ **The project : customer, application, technology**
- ▶ **The tool: aims, concepts, technology**
- ▶ **The project: experiences, feedback**

# BREDEX development

- ▶ **Development of enterprise applications**

  - Platform independent

- ▶ **Mobile development**

  - Mobile business applications

  - Platform independent

  - Individual technology choice

    - native

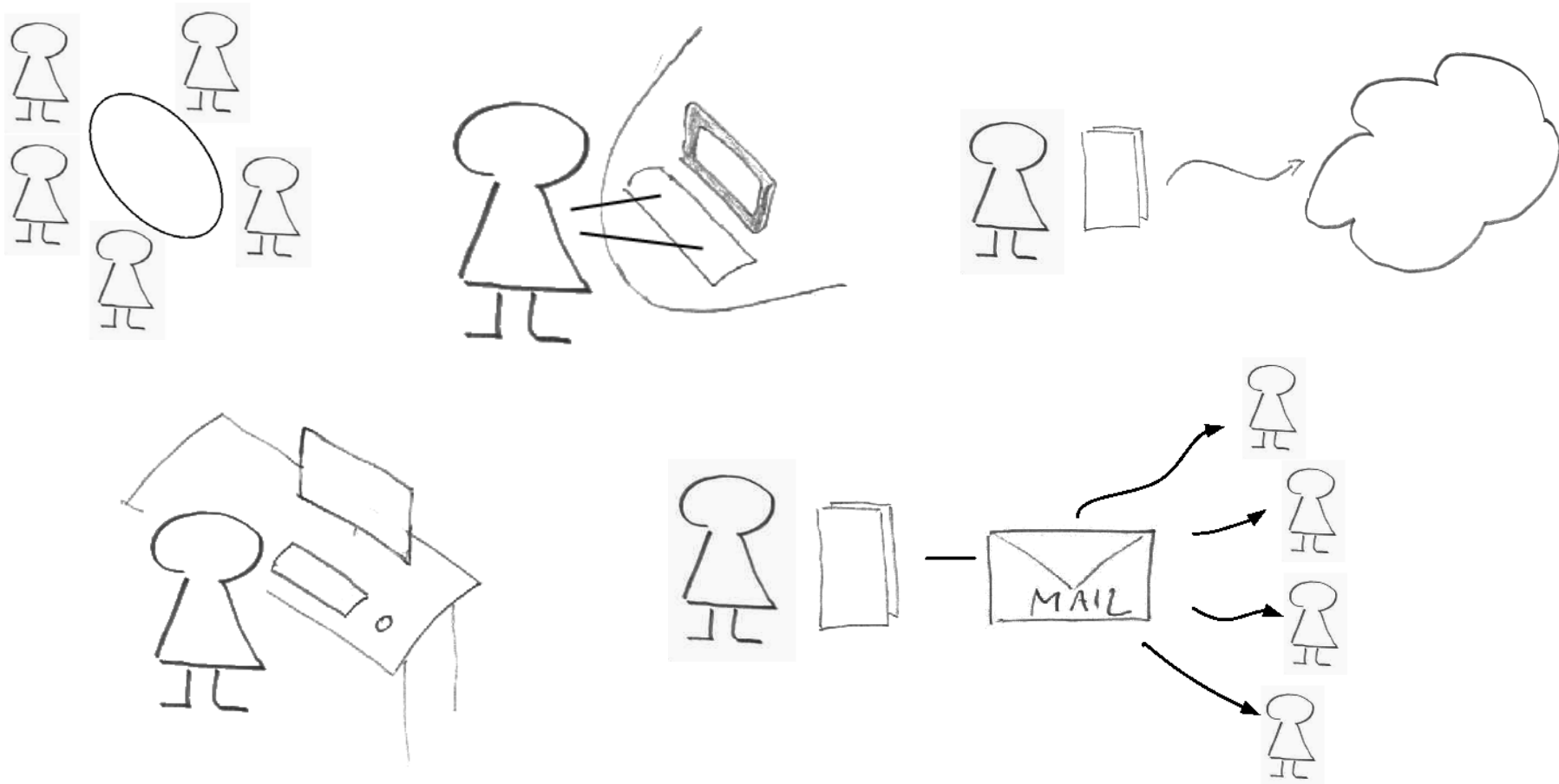
    - cross platform

    - web-based

  - Test automation



# The user story



# Demo: Protocol-App

# The App

- ▶ **Creation and distribution of protocols**
- ▶ **Creation on mobile device**
  - Tablet (iOS, Android, Windows 8), Laptop
  - Cross platform solution (Xamarin Mono)
  - Offline Support for protocol creation
- ▶ **Optional editing on desktop computer**
- ▶ **Distribution as PDF via mail**
- ▶ **Functions to manage existing protocols**
- ▶ **Automated tests with *GUIDancer***

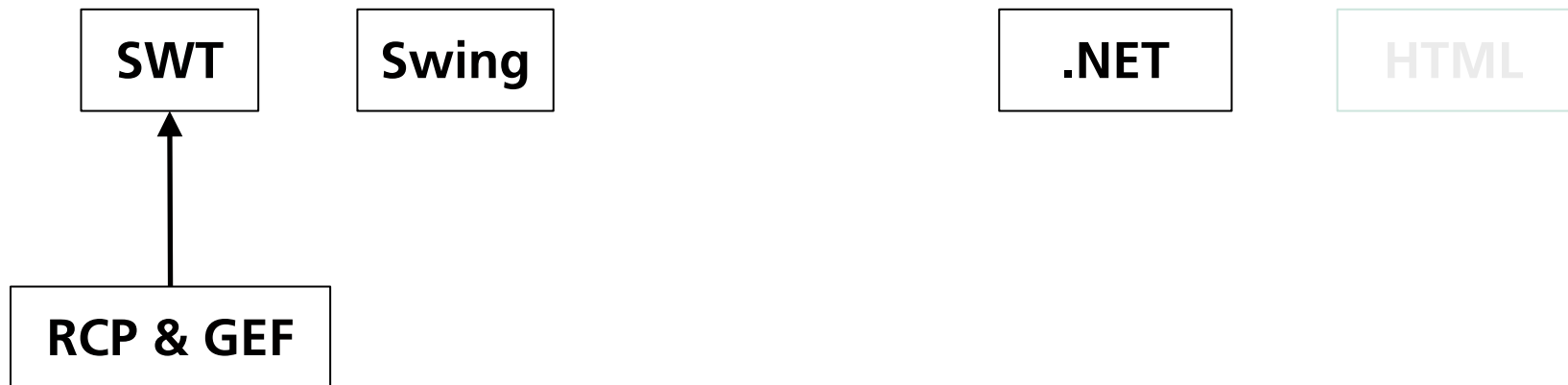


# Aims

- ▶ **mobile UI Toolkits for Jubula / GUIDancer**  
Open-Source version: [www.eclipse.org/jubula](http://www.eclipse.org/jubula)
- ▶ **„Code-free keyword-based black-box testing“ – mobile!**  
high-level test steps + robust object recognition
- ▶ **Like in the desktop world: cross-...**

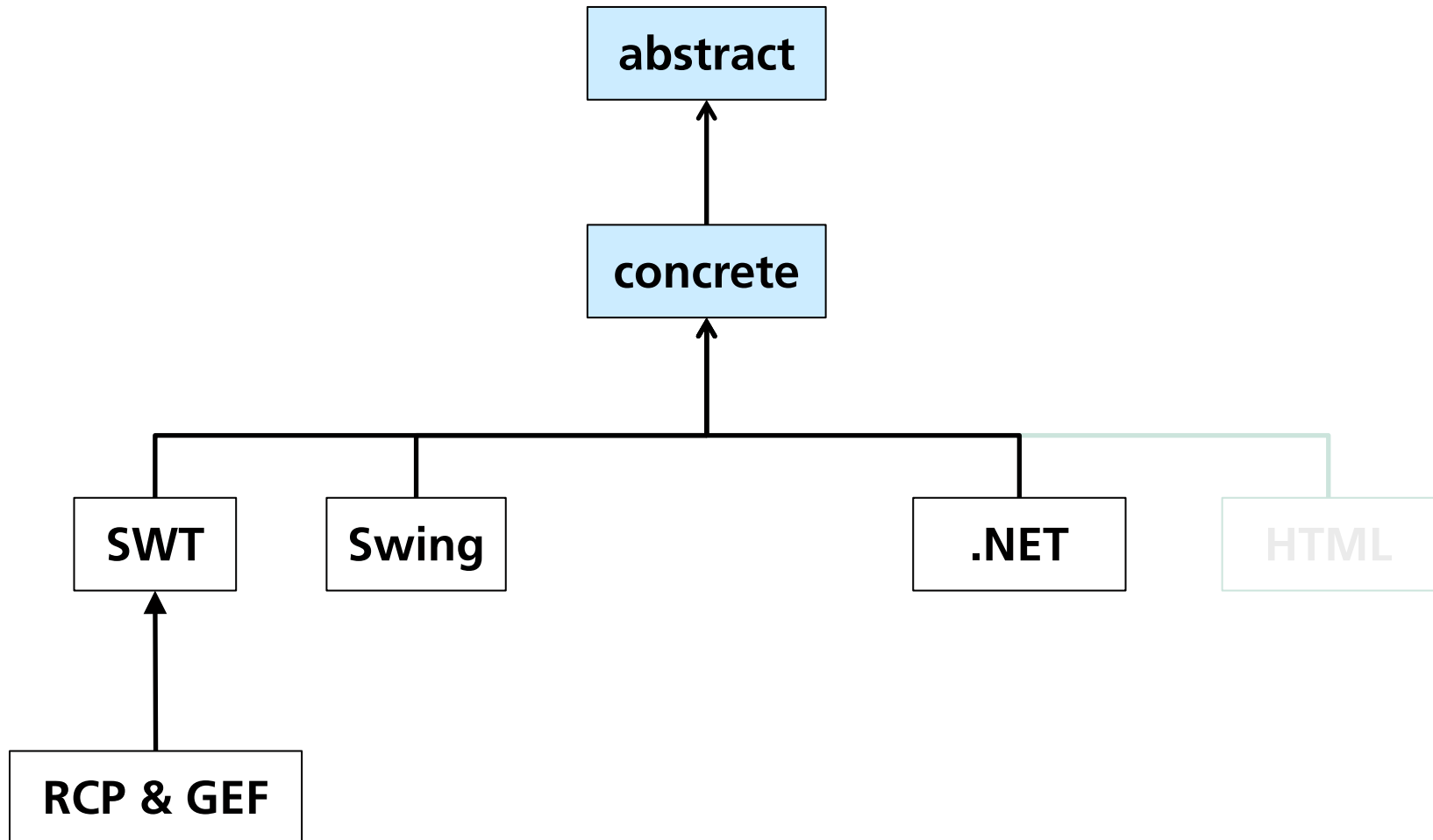
	iOS	Windows	Android
Version	5+	8+	2.3+
Class	Tablet / Phone / Hybrid		
Environment	Simulator / Hardware		
	Rotation, Network...		

# Concept: Toolkit abstraction

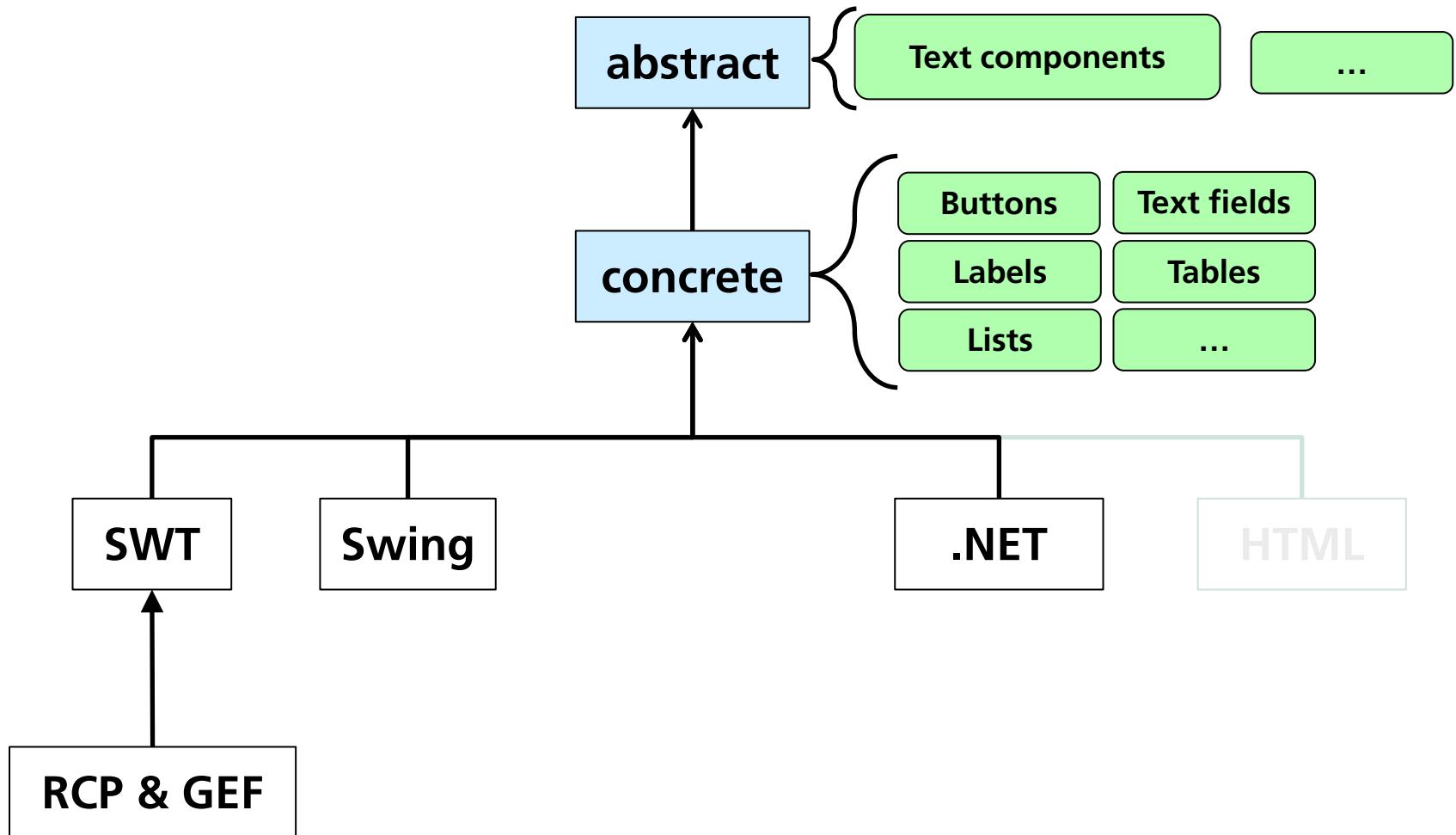




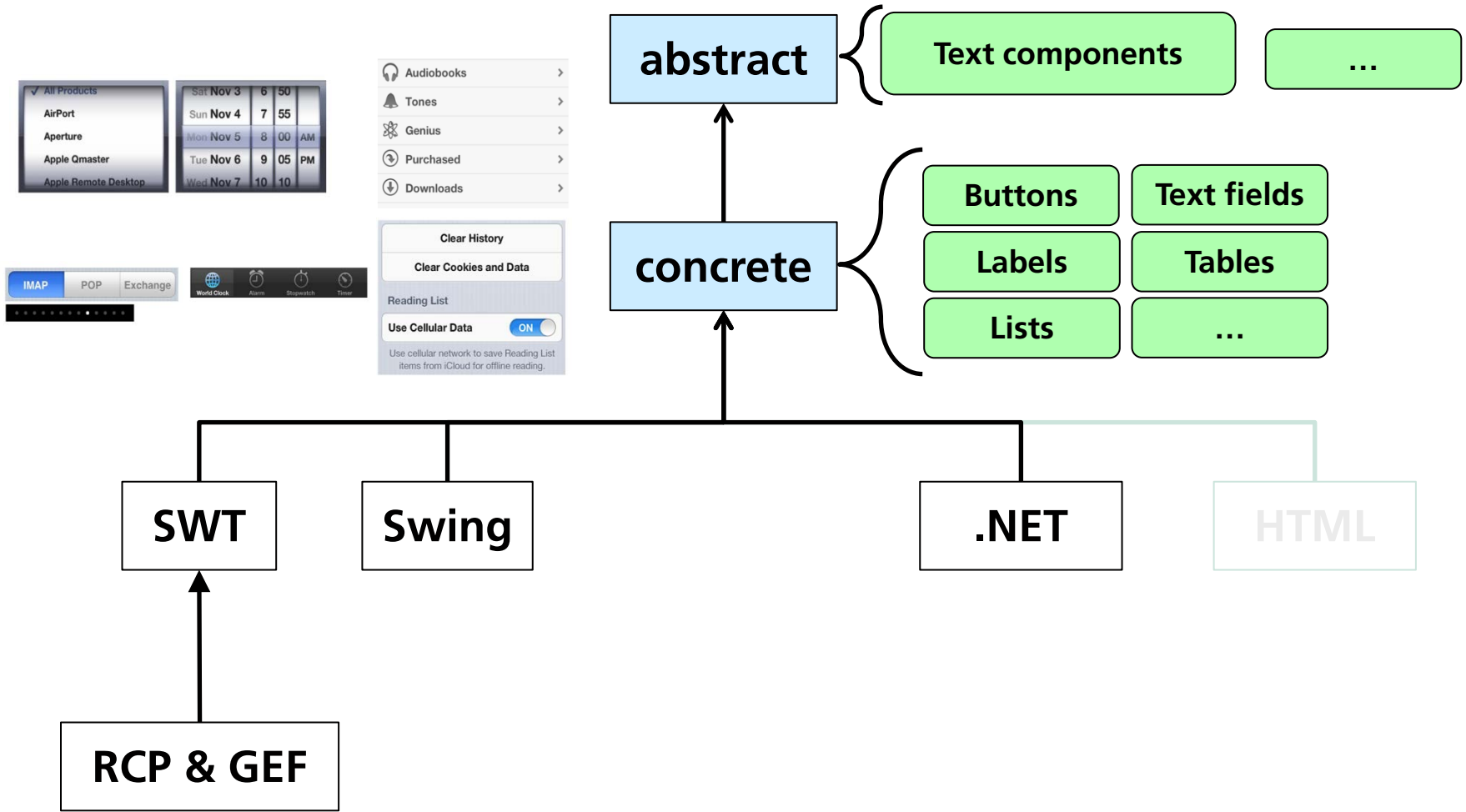
# Concept: Toolkit abstraction



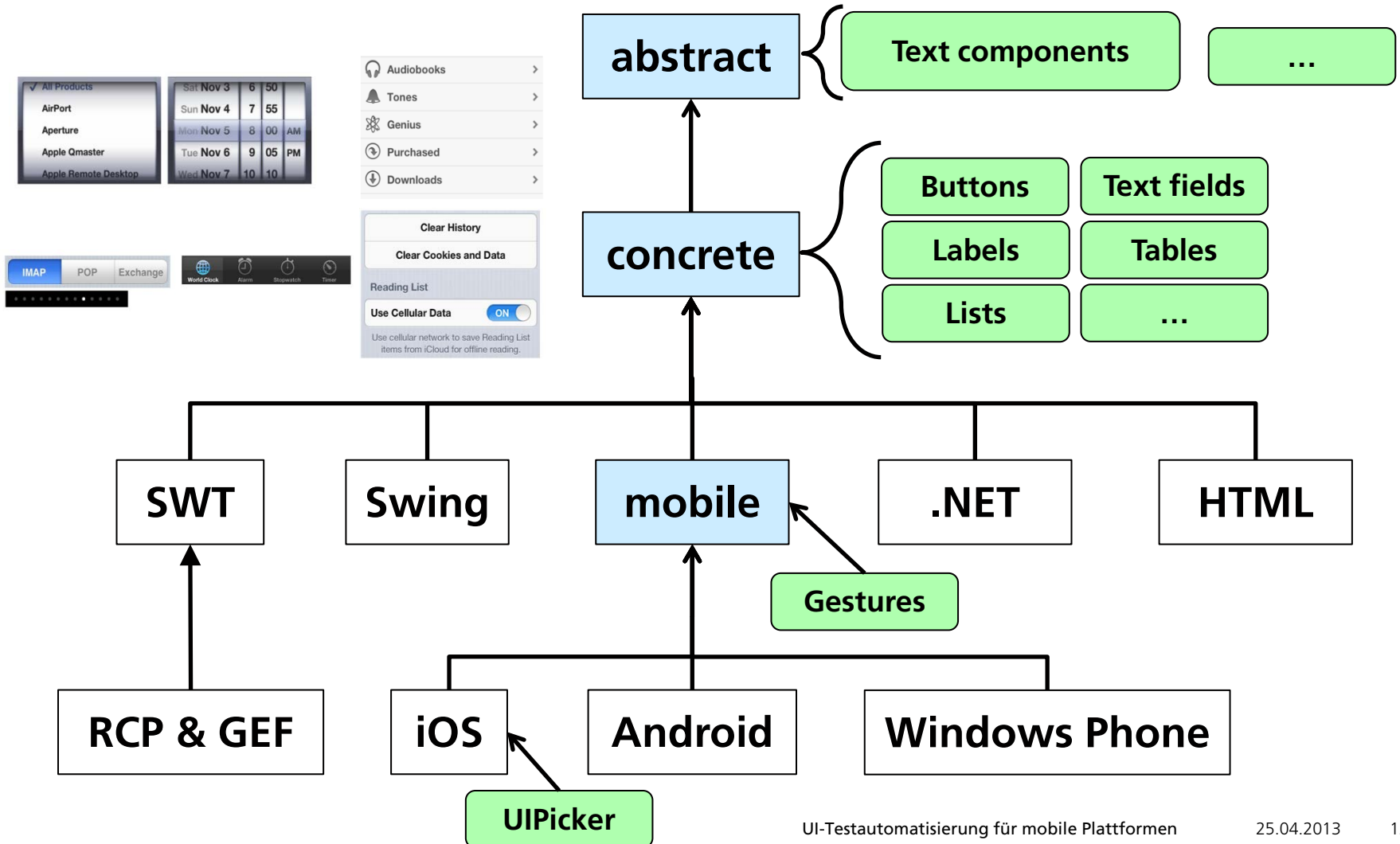
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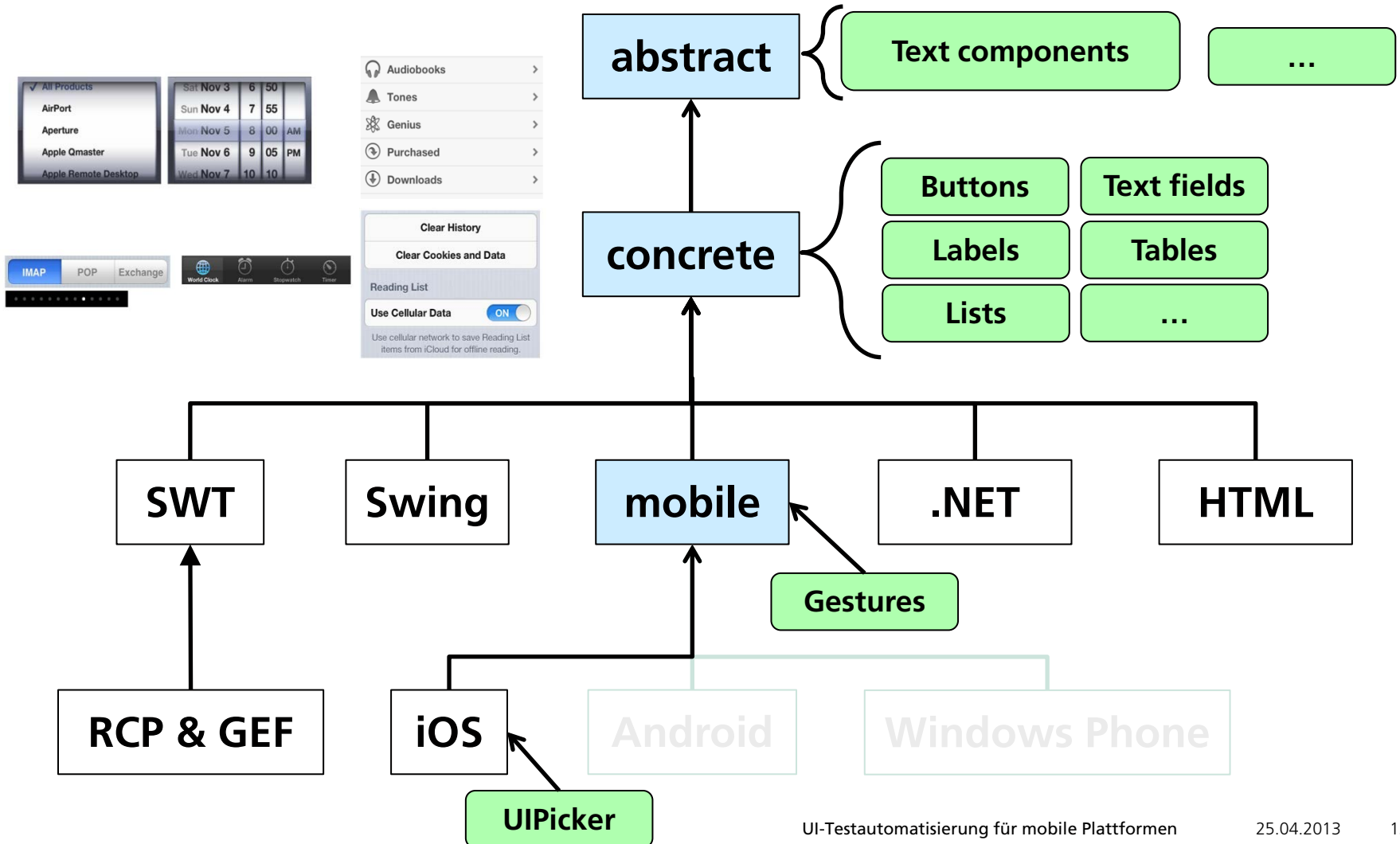
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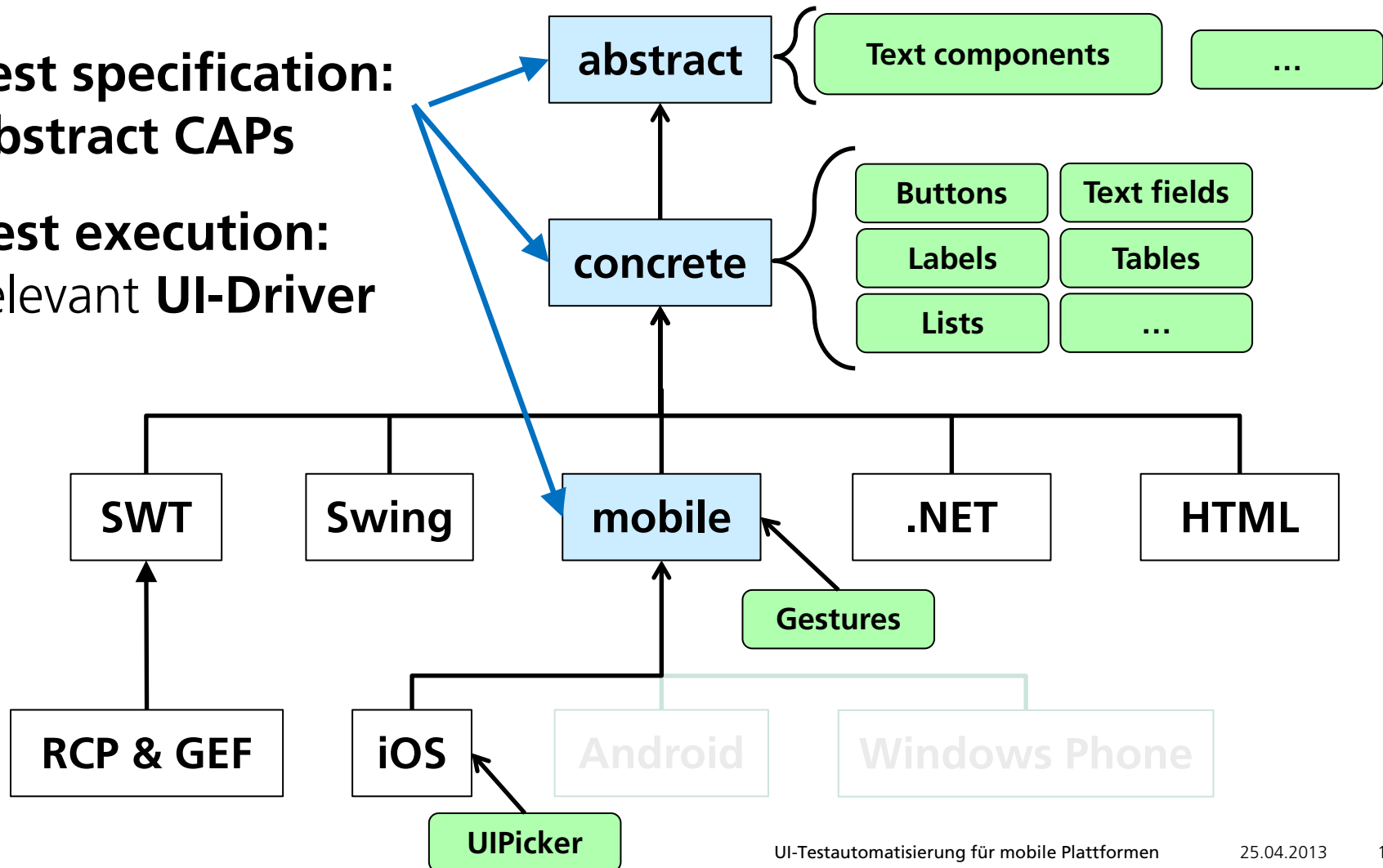
# Concept: Toolkit abstraction



# Concept: Toolkit abstraction

**Test specification:**  
abstract CAPs

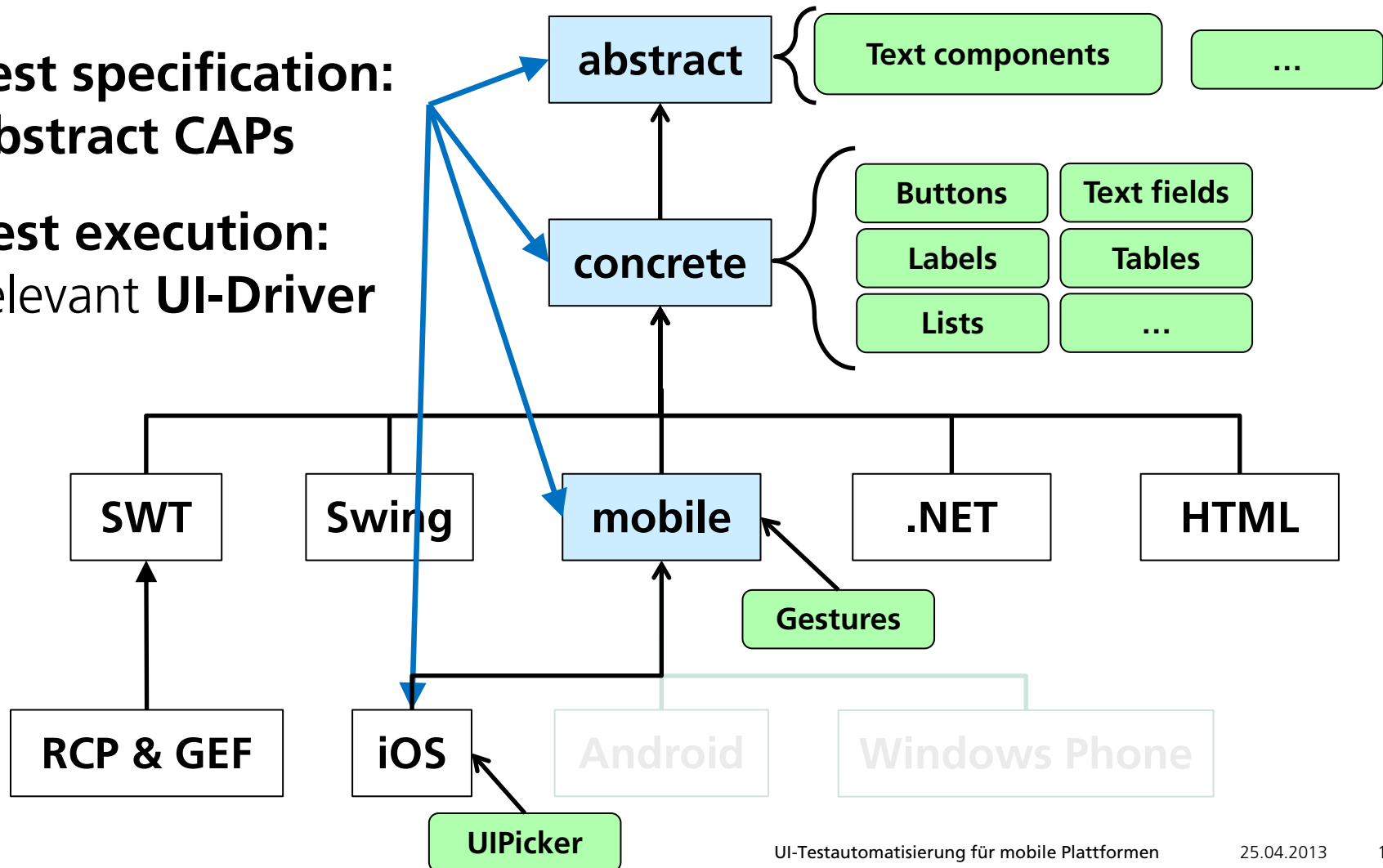
**Test execution:**  
relevant **UI-Driver**




# Concept: Toolkit abstraction













**Test specification:**  
abstract CAPs

**Test execution:**  
relevant **UI-Driver**



# Concept: Test specification and mapping

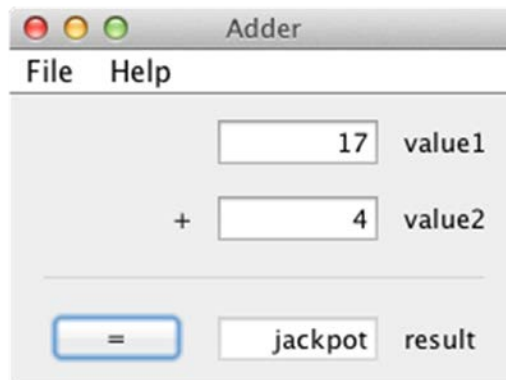
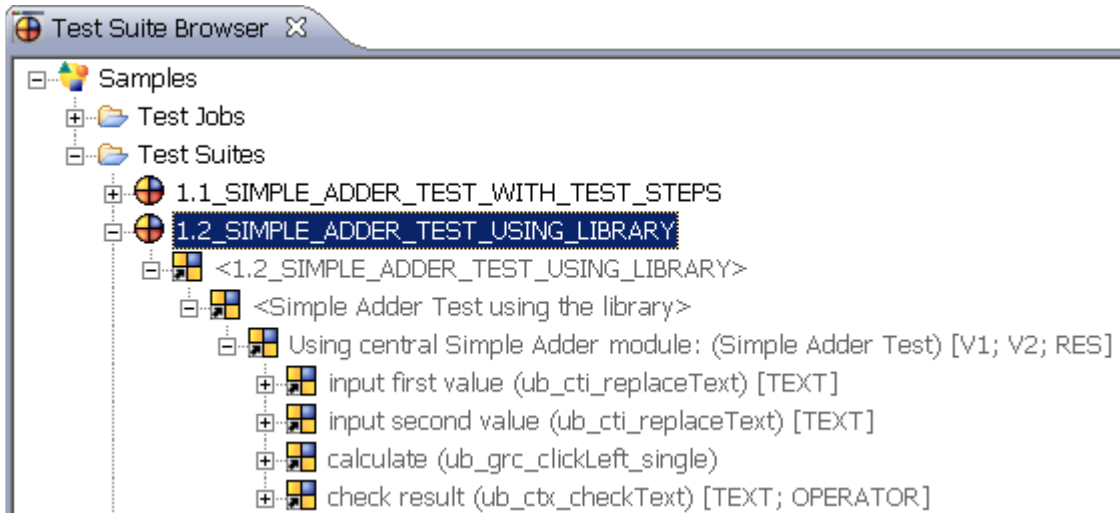
Test Suite Browser 

- [-]  Samples
  - [+]  Test Jobs
  - [-]  Test Suites
    - [+]  1.1\_SIMPLE\_ADDER\_TEST\_WITH\_TEST\_STEPS
    - [-]  **1.2\_SIMPLE\_ADDER\_TEST\_USING\_LIBRARY**
      - [-]  <1.2\_SIMPLE\_ADDER\_TEST\_USING\_LIBRARY>
        - [-]  <Simple Adder Test using the library>
          - [-]  Using central Simple Adder module: (Simple Adder Test) [V1; V2; RES]
            - [+]  input first value (ub\_cti\_replaceText) [TEXT]
            - [+]  input second value (ub\_cti\_replaceText) [TEXT]
            - [+]  calculate (ub\_grc\_clickLeft\_single)
            - [+]  check result (ub\_ctx\_checkText) [TEXT; OPERATOR]

	<input type="text" value="17"/>
+	<input type="text" value="4"/>
=	jackpot



# Konzept: Testspezifikation + Mapping

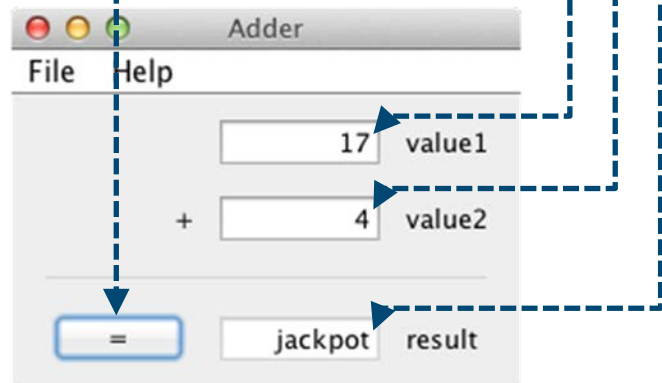


Swing

# Konzept: Testspezifikation + Mapping

Test Suite Browser

- Samples
  - Test Jobs
  - Test Suites
    - 1.1\_SIMPLE\_ADDER\_TEST\_WITH\_TEST\_STEPS
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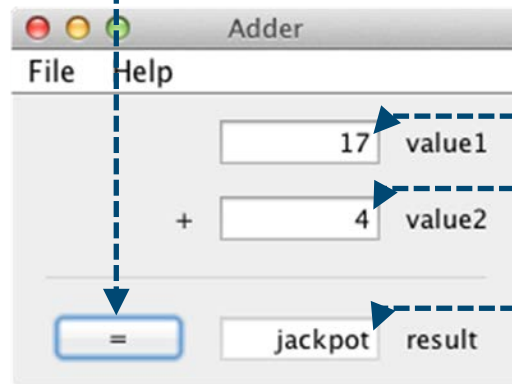
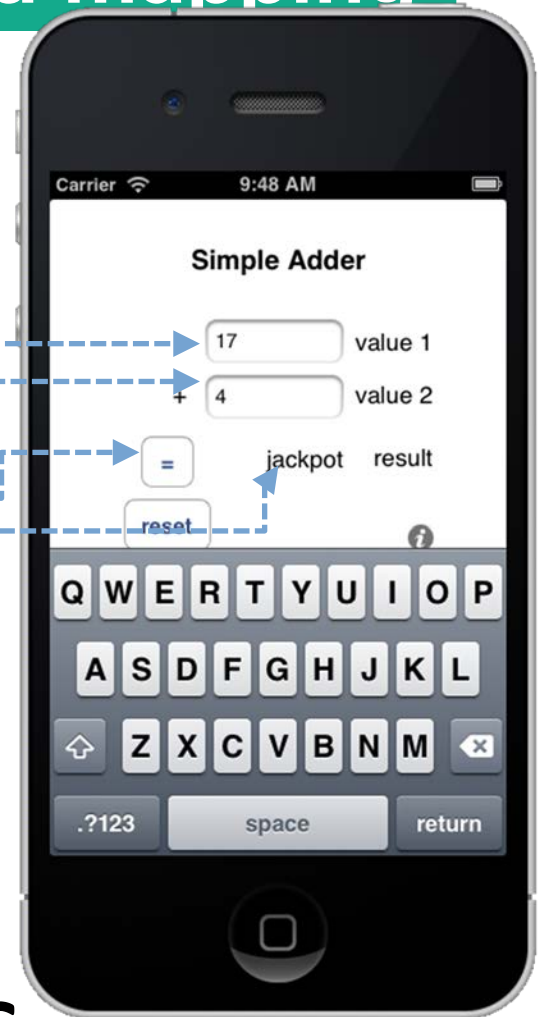
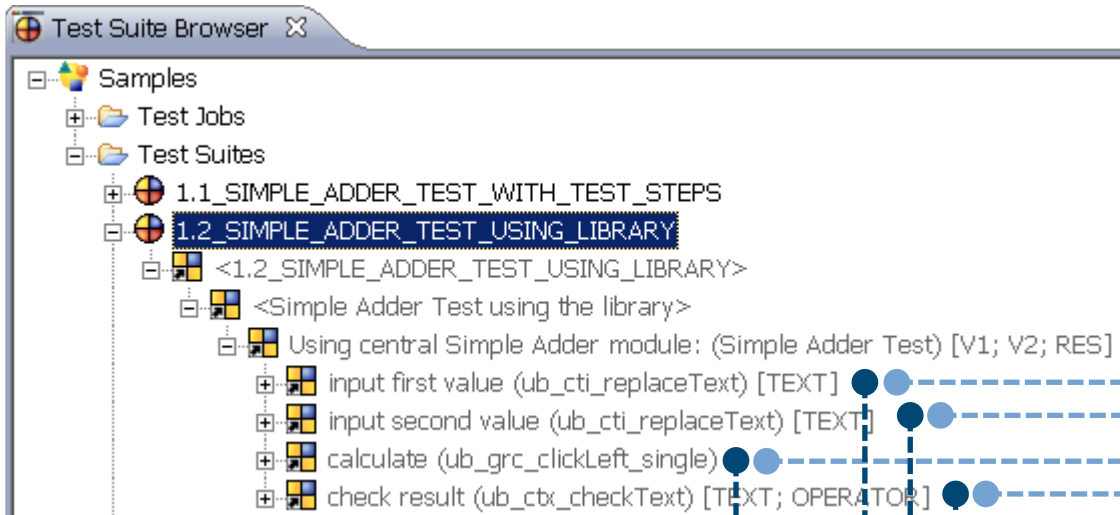


The screenshot shows the 'Adder' application window with the following UI elements and their corresponding test steps:

- Test Step: 'input first value (ub\_cti\_replaceText) [TEXT]' maps to the text input field containing '17' (labeled 'value1').
- Test Step: 'input second value (ub\_cti\_replaceText) [TEXT]' maps to the text input field containing '4' (labeled 'value2').
- Test Step: 'calculate (ub\_grc\_clickLeft\_single)' maps to the '=' button.
- Test Step: 'check result (ub\_ctx\_checkText) [TEXT; OPERATOR]' maps to the text field containing 'jackpot' (labeled 'result').

Swing

# Concept: Test specification and mapping



Swing

iOS

# Demo: Test specification + Mapping

# UI-Driver: iOS – Technology

- ▶ **Driver Robot API: KIF – Keep it functional**
- ▶ **iOS Sandbox Principle**
  - AUT source code modification is necessary
  - Limitations for AUT start / restart
- ▶ **Support**
  - iOS 5+
  - Simulator + Devices: iPad (mini), iPhone, iPod, ...
  - non-continuous gestures
  - Cross-Platform Mobile Frameworks: e.g. Mono-Touch

# Demo: Automated test for the protocol app

# UI-Driver: Windows - Technology

## ▶ Driver Robot API

Microsoft UI Automation Framework

**No** cross-UI Toolkit abstraction!

## ▶ Support

.NET from 3.5+

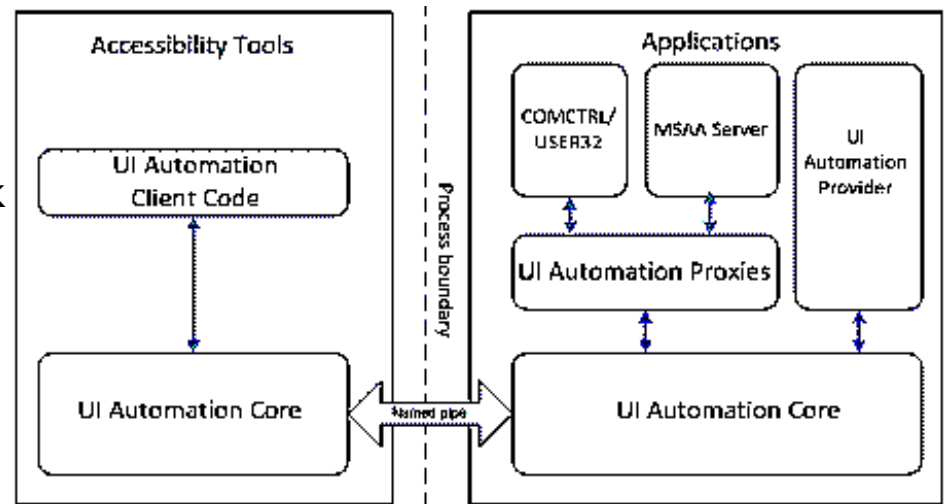
UI Toolkits

WinForms

WPF & Metro planned

Operating system

all except Windows RT



<http://i.msdn.microsoft.com/dynimg/IC276880.gif>

# Experiences

## ▶ Experiences from the protocol app and another iOS customer project



Platform support

Windows, iOS

Android, Windows RT: to do

Effort for Integration: low

**GUIDancer:** AUT source code must be available

Integration in CI: successful

Learning curve for tester: steep (good)





# Challenges & limitations

## ▶ **Problem: Keyboard layout**

Context-dependent, platform-dependent

Device-dependent, language-dependent

To do: Reaching characters via long tap

## ▶ **Challenges: Navigation concepts**

Android / iOS: tabbed user interface

Windows 8 Modern style: hub design

## ▶ **Limitations: Environment parameters**

Screen rotation, connectivity



# What's coming

- ▶ **Automated UI-Tests for other mobile OS**  
Support for Android and Windows RT
- ▶ **Combination of platform independent and specific test steps**
- ▶ **Abstraction for different navigation concepts**