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IBM Mobile Enterprise Development Solution

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Why are we here?

10 Billion devices by 2020

61% of CIOs put mobile as priority

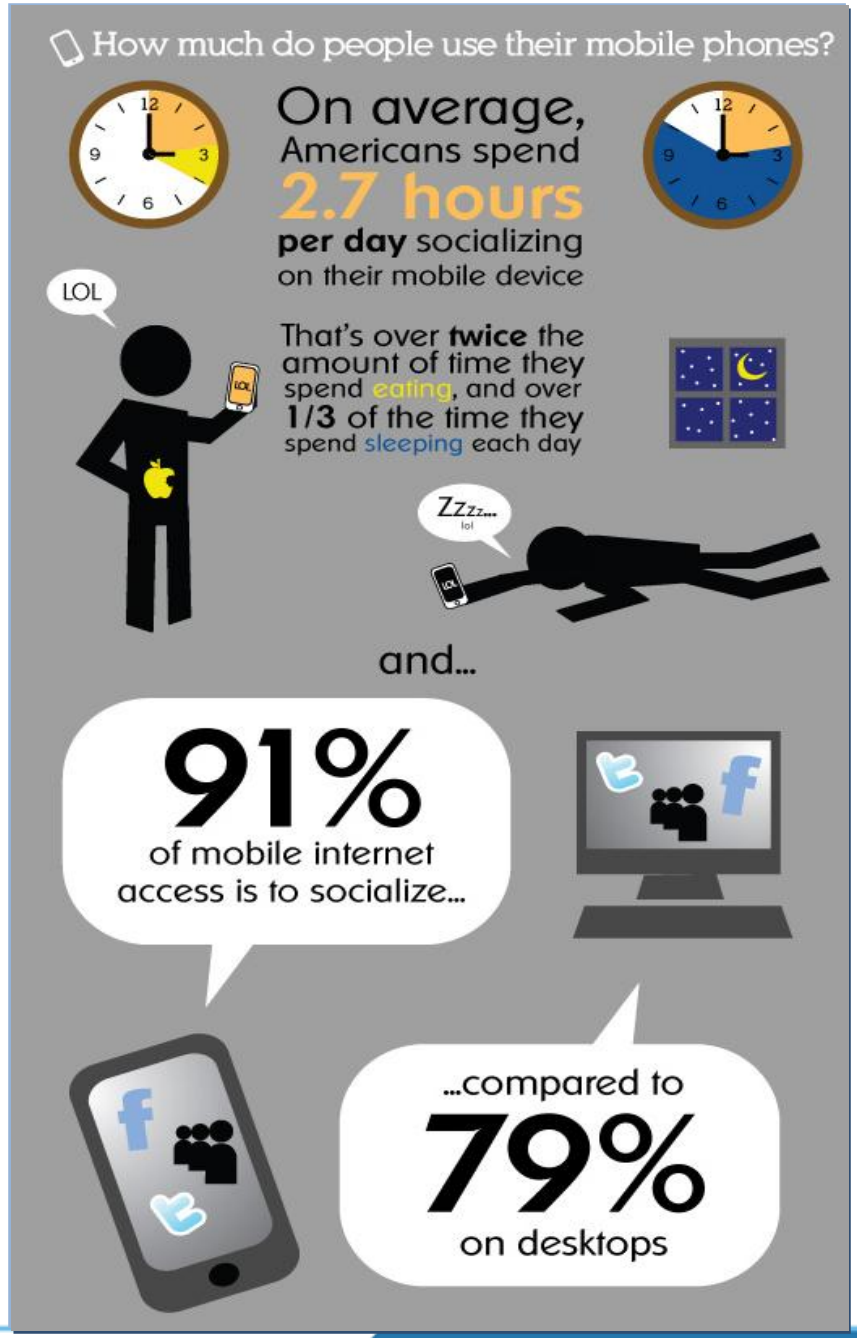
45% increased productivity with mobile apps

300,000 apps developed in last 3 years

76.9 billion App downloads by 2014

70% Customer interactions to originate from mobile by 2015

Cross-platform UX becoming critical



Source: mashable.com

The IBM Seer App for Wimbledon

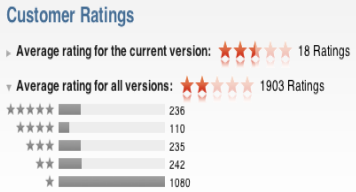
Top mobile development pain points for an app such as Seer

Developing for multiple mobile platforms

- Highly fragmented set of platforms, devices, languages, and tools **increases cost and complexity of development and test**
- Choosing not to support one or more platforms **reduces the reach of an application**

Delivering high quality apps that engage users and meet business objectives

- Poor quality can **negatively impact brand image**
- Bad ratings and comments can **cause other users to avoid trying an app**



Integrating with enterprise systems

- Recreating instead of leveraging existing business logic **increases maintenance costs and risk of inconsistent behavior**
- Lack of ready back-end services **slows front-end development** and **increases potential for last minute integration issues**

Meeting accelerated time to market requirements

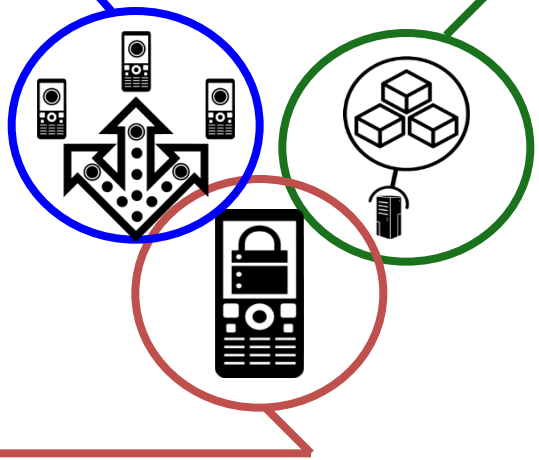
- Hand-off errors and delays between teams **slows progress and responsiveness to features and fixes**
- Misalignment of stakeholders **results in late rework and increased cycle times**

Imperatives in building mobile apps

Extend & Transform

Extend *existing business capabilities to mobile devices*

Transform *the business by creating new opportunities*



Build & Connect

Build *mobile applications*

Connect *to, and* ***run*** *backend systems in support of mobile*

Manage & Secure

Manage *mobile devices and applications*

Secure *my mobile business*

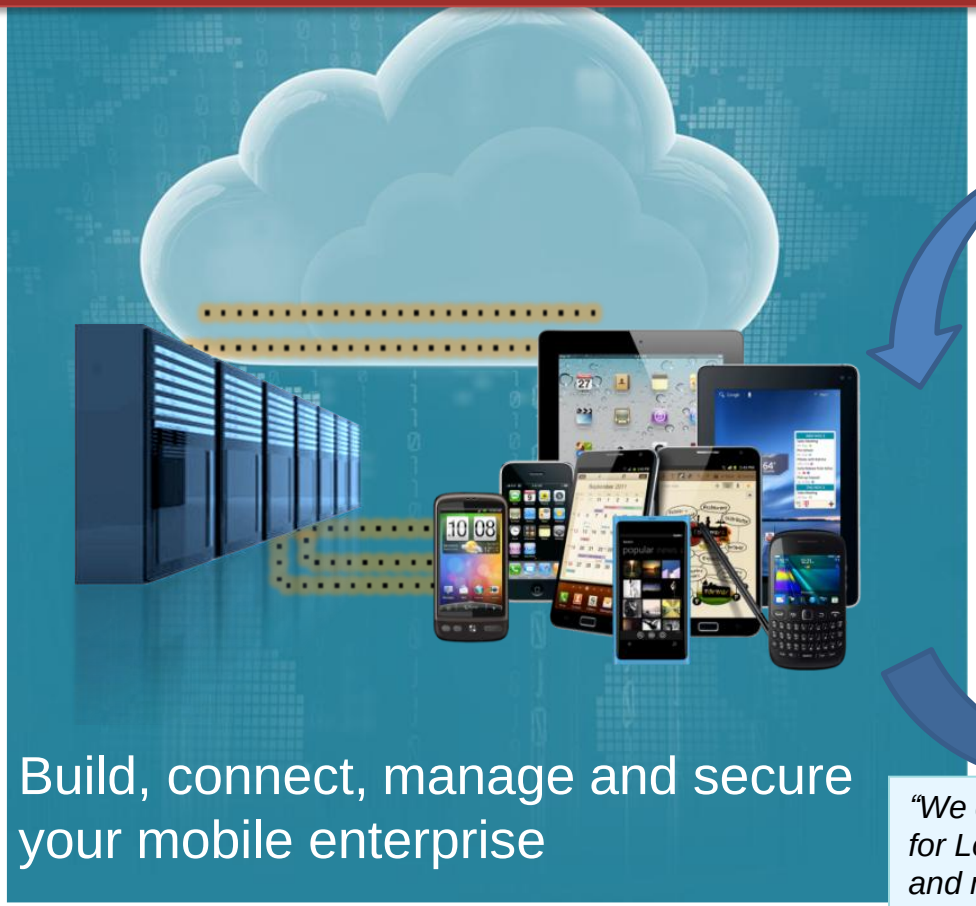
These challenges cannot be addressed using development tools alone!

Some kind of device neutral mobile run-time code is necessary.

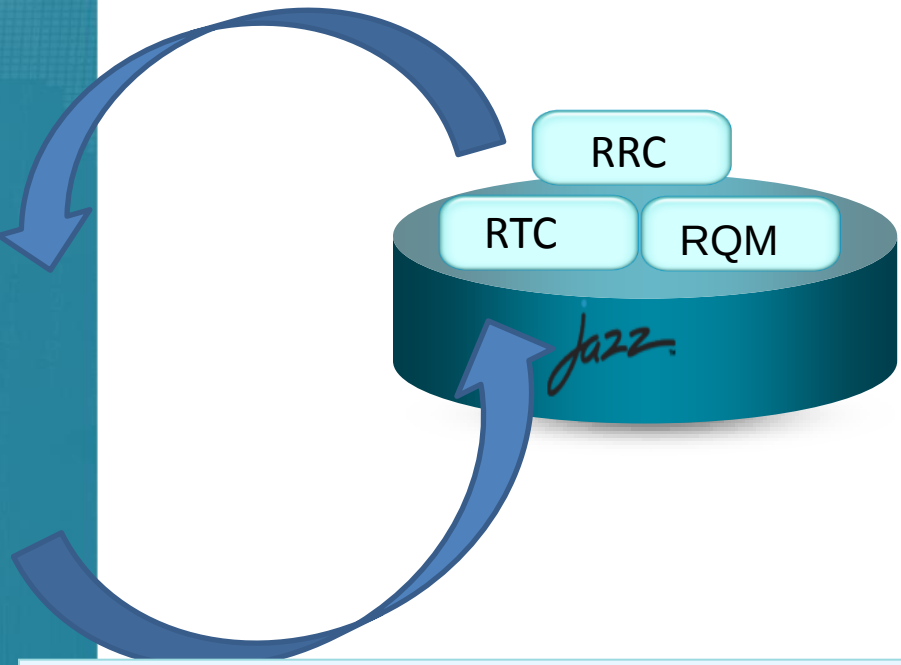
These device neutral mobile run-time products are known as Mobile Application Platforms. And they typically come with some associated code construction tooling.

Introducing: The IBM Mobile Enterprise Solution

Includes IBM Worklight V5.0, IBM WebSphere Cast Iron, IBM Endpoint Manager for Mobile Devices



Build, connect, manage and secure your mobile enterprise

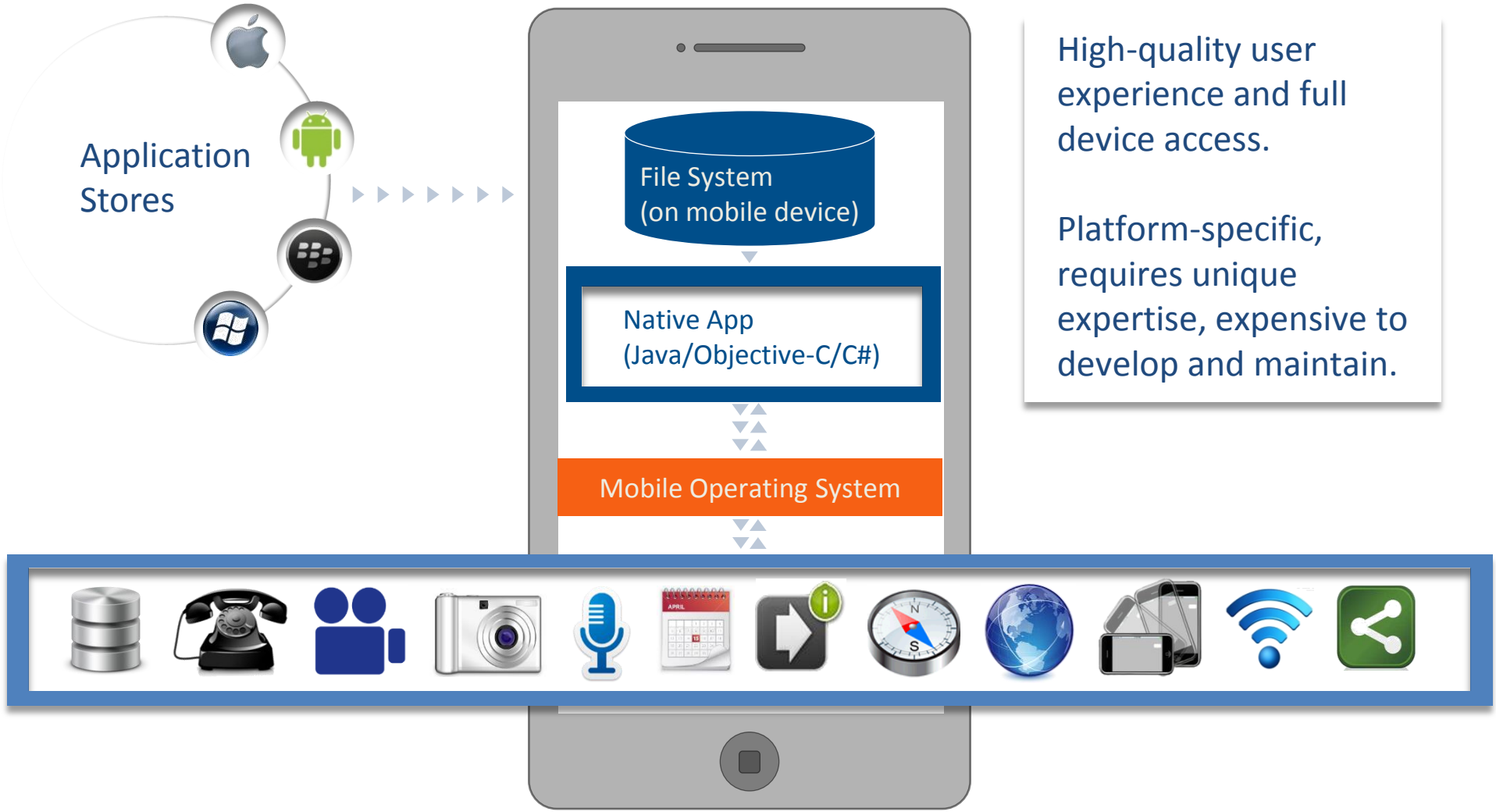


"We chose IBM Worklight because it was the best technology for Lotte to consolidate application development, enhancement and maintenance, while ensuring cost savings and timely delivery to our customers."

— Kang, Chang Nam, IT Planning Director, Lotte Credit Card

Challenge 1: Developing for multiple mobile platforms

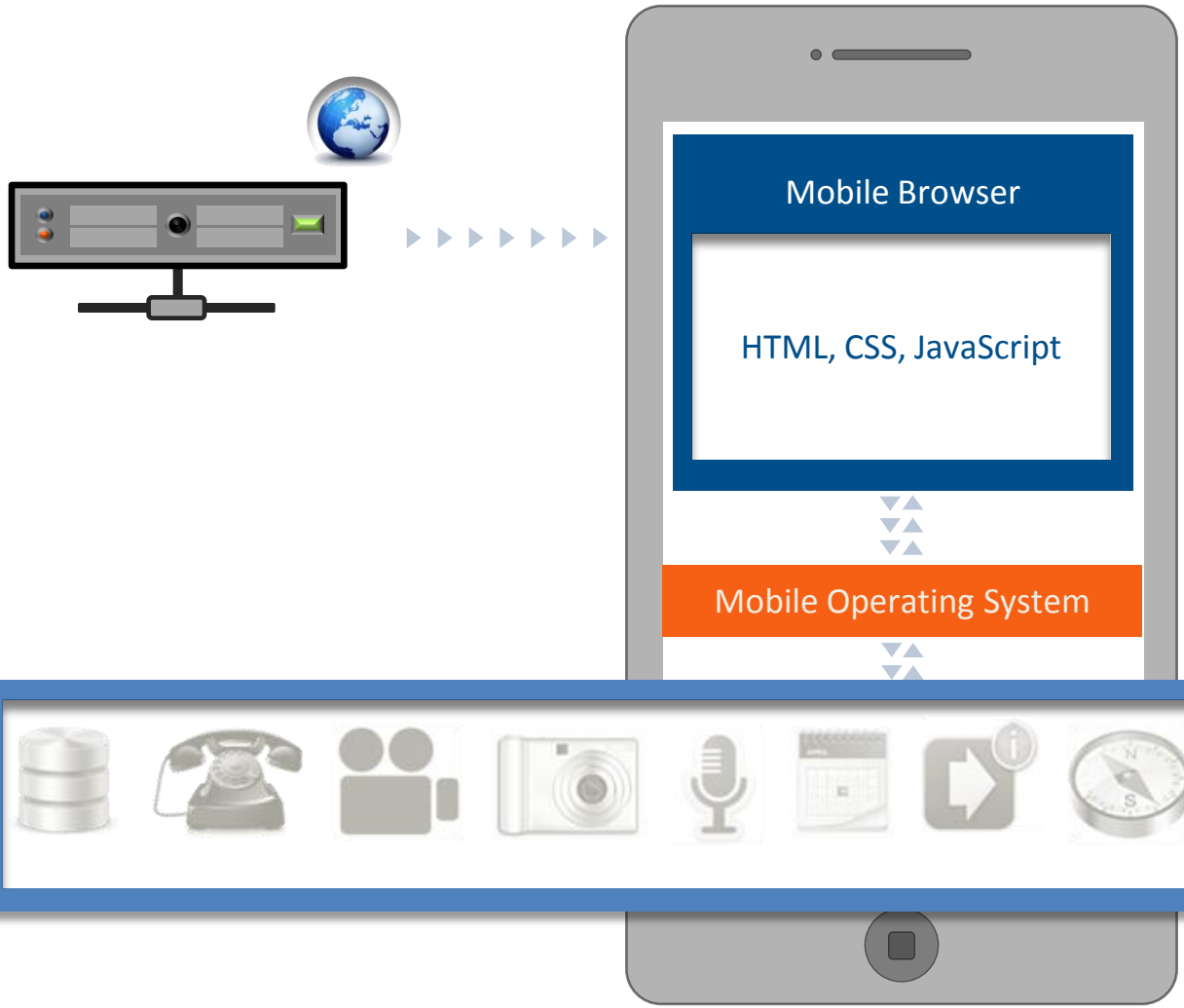
Downloadable (Native) Apps



High-quality user experience and full device access.

Platform-specific, requires unique expertise, expensive to develop and maintain.

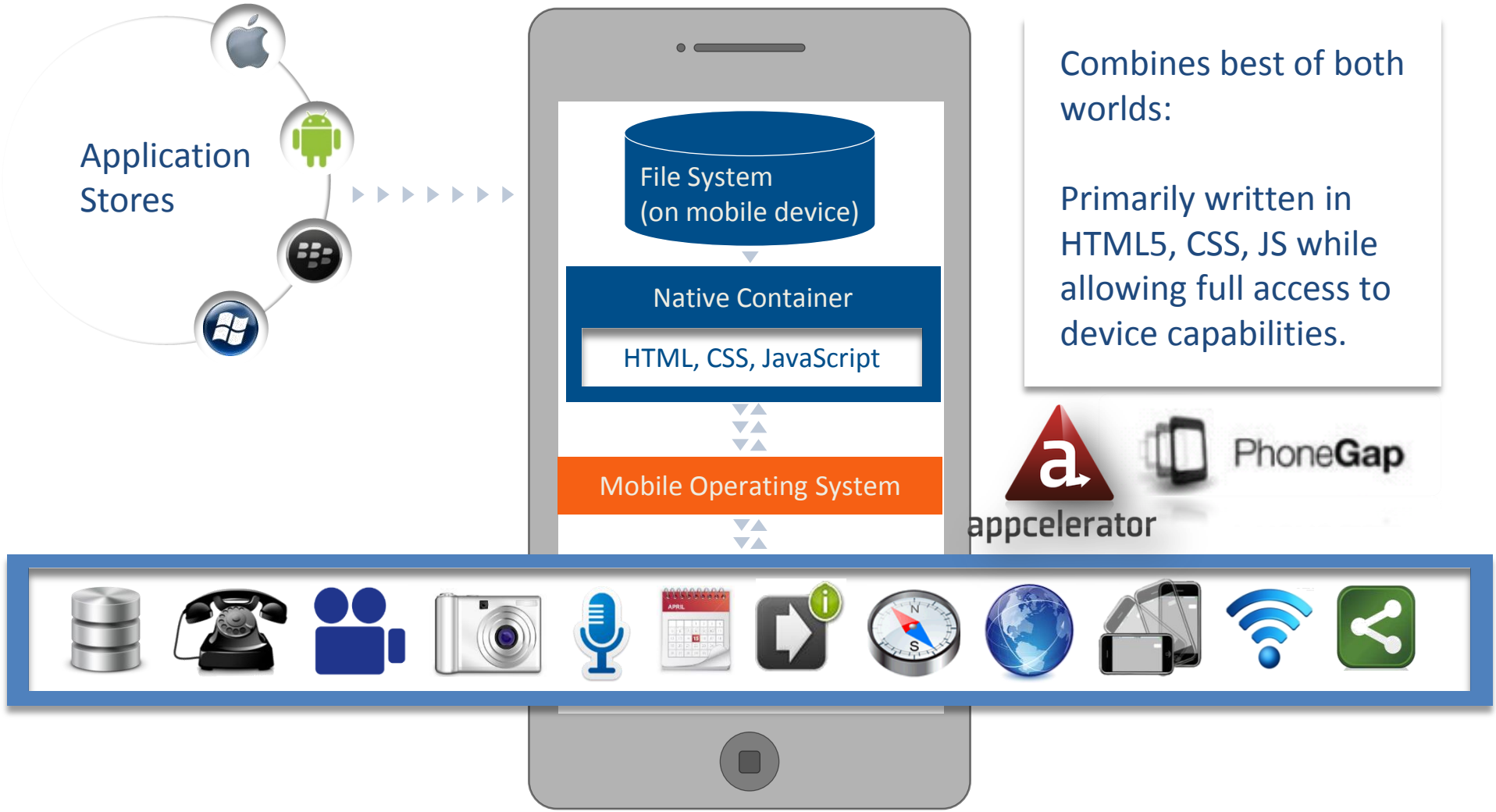
Web Apps



Written in HTML5 JavaScript and CSS3. Quick and cheap to develop.

Less powerful than native and limited device access.

Hybrid Apps



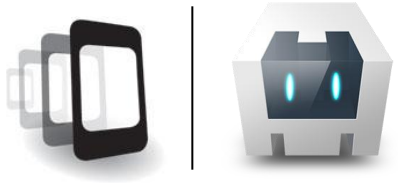
Combines best of both worlds:

Primarily written in HTML5, CSS, JS while allowing full access to device capabilities.

appcelerator

PhoneGap

What is Phonegap (or Apache Cordova)?



- Consider – a web-based movie ticket booking application that lets you invite friends from the phone contact book. Problems:
  - How can you query the platform's contact book from within your web app?
  - How can you do so in a platform agnostic way?
  - How can you mix web page to book the ticket and a native page to show contact book?
- Phonegap shows the way - provides javascript APIs which abstract the platform's native services.
- Develop an app using HTML5, Dojo, javascript once. Package it for various platforms using Phonegap.
- Use any UI toolkit – Dojox.mobile, Sencha touch, Titanium, etc.
- Integrate native elements with the web-based elements.

Supported features

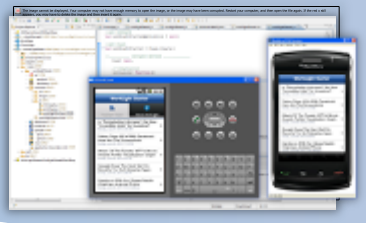
	iPhone / iPhone 3G	iPhone 3GS and newer	Android	OS 4.6-4.7	OS 5.x	OS 6.0+	WebOS	WP7	Symbian	Bada
ACCELEROMETER	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓
CAMERA	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓
COMPASS	✗	✓	✓	✗	✗	✗	✗	✓	✗	✓
CONTACTS	✓	✓	✓	✗	✓	✓	✗	✓	✓	✓
FILE	✓	✓	✓	✗	✓	✓	✗	✓	✗	✗
GEOLOCATION	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MEDIA	✓	✓	✓	✗	✗	✗	✗	✓	✗	✗
NETWORK	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NOTIFICATION (ALERT)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NOTIFICATION (SOUND)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NOTIFICATION (VIBRATION)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Solution: IBM Worklight

- Develop rich mobile apps that work across all major platforms using **standard technologies**, such as HTML5
- Supports **mobile web and hybrid approaches** – enables common code base across platforms, but with the ability to access native functions
- Connect apps to enterprise back-end systems and cloud services through **mobile-optimized middleware**
- Manage applications and versioning from one **centralized admin console**

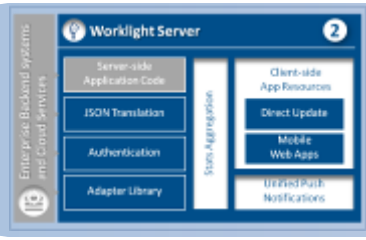
Worklight

Worklight mobile platform overview



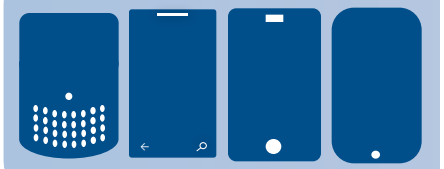
Worklight Studio

The most complete, extensible development environment with maximum code reuse and per-device optimization



Worklight Server

Mobile middleware offering unified push notifications, version management, security and integration



Worklight Runtime Components

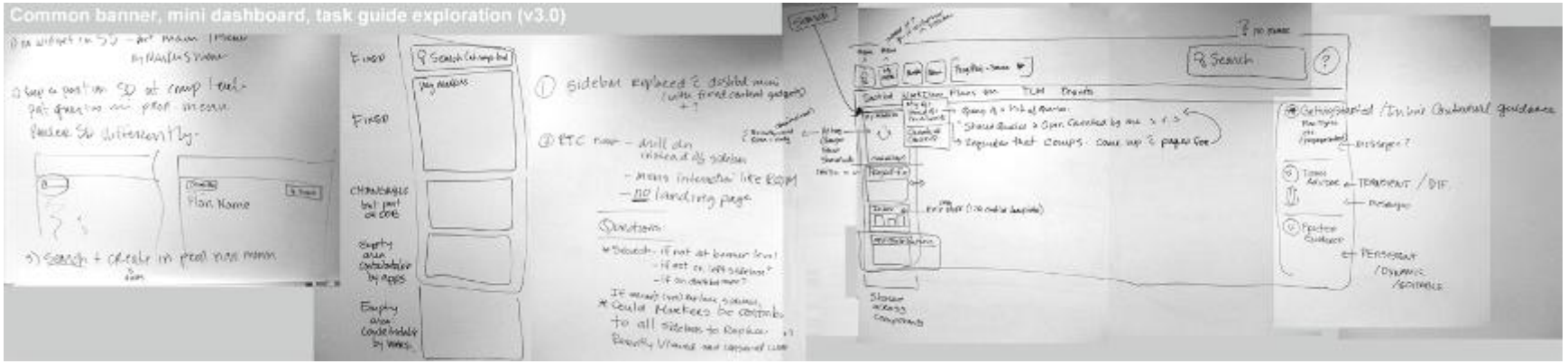
Extensive libraries and client APIs that expose and interface with native device functionality and the Worklight Server

Worklight Console

A web-based console for real-time analytics and control of your mobile apps and infrastructure

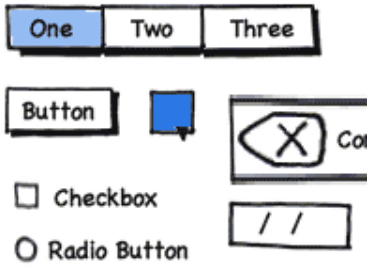
Application visualization

Is this how it's done?



- First class user experience is critical in modern applications
  - Particularly true with mobile applications
- Teams achieve first class user experience by iterating through a "UI Lifecycle"
  - Spans from
    - **Low fidelity**, easily changeable **sketches**
    - to **high fidelity wireframes**
    - to **UI implementation**
  - Different teams do it different ways.

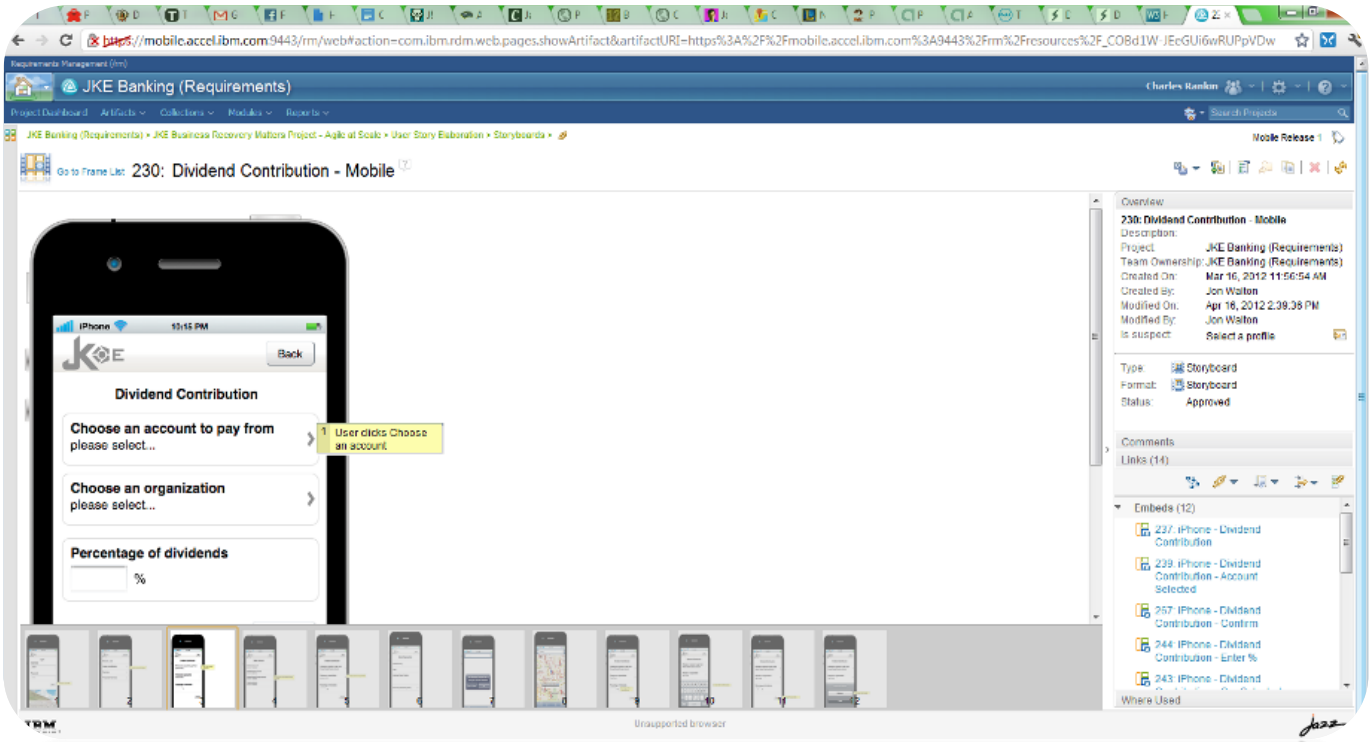
The UI lifecycle



UI Sketching

The UI lifecycle

UI Sketching

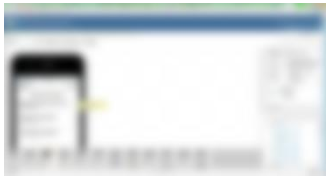


UI Specification

Tool shown: Rational Requirements Composer
Capture requirements into a rough UI sketch and create a storyboard

The UI lifecycle

UI Sketching



UI Specification

Choose a UI toolkit

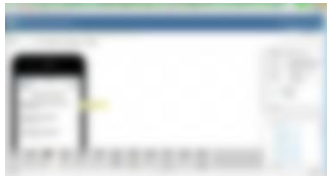
Dojo Mobile

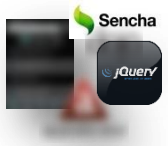
- A Dojo-based JavaScript widget set for creating mobile web applications
  - Available since Dojo 1.5 in open source as experimental
  - GA in Dojo 1.6
  - IBM support via IBM Web2.0, IBM Worklight and Mobile Feature Pack for WebSphere 1.1
- Provides lightweight UI widgets for mobile scenarios
  - Native device access or coding is not in the scope of Dojo Mobile (use PhoneGap for this)
- Allows developing device-specific or device-neutral look & feel applications
  - iPhone, Android, Blackberry or create your own custom themes
- Server technology agnostic
- Reuse application code across devices with a simple style sheet change!

Dojo 1.7 Themes: iPhone, iPad, Android 2.x, Blackberry

Manual or Automatic device detection to apply themes

The UI lifecycle

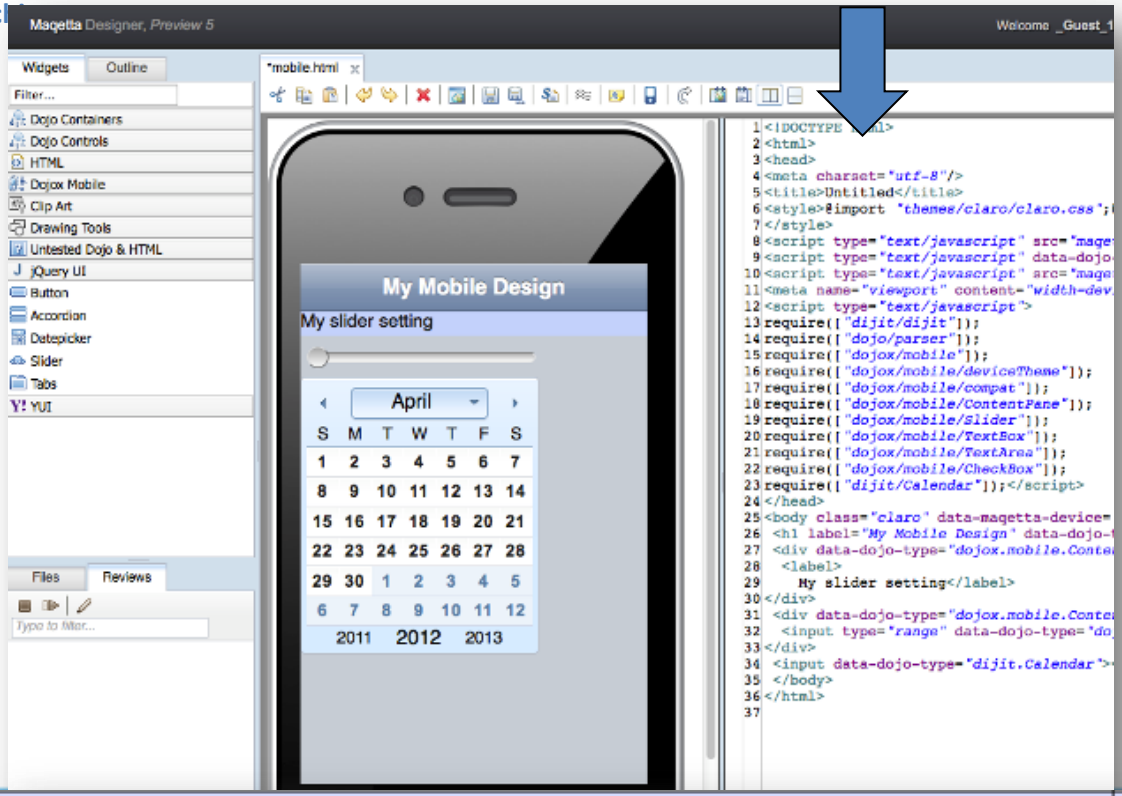




UI Sketch

UI Specification

Choose a UI toolkit



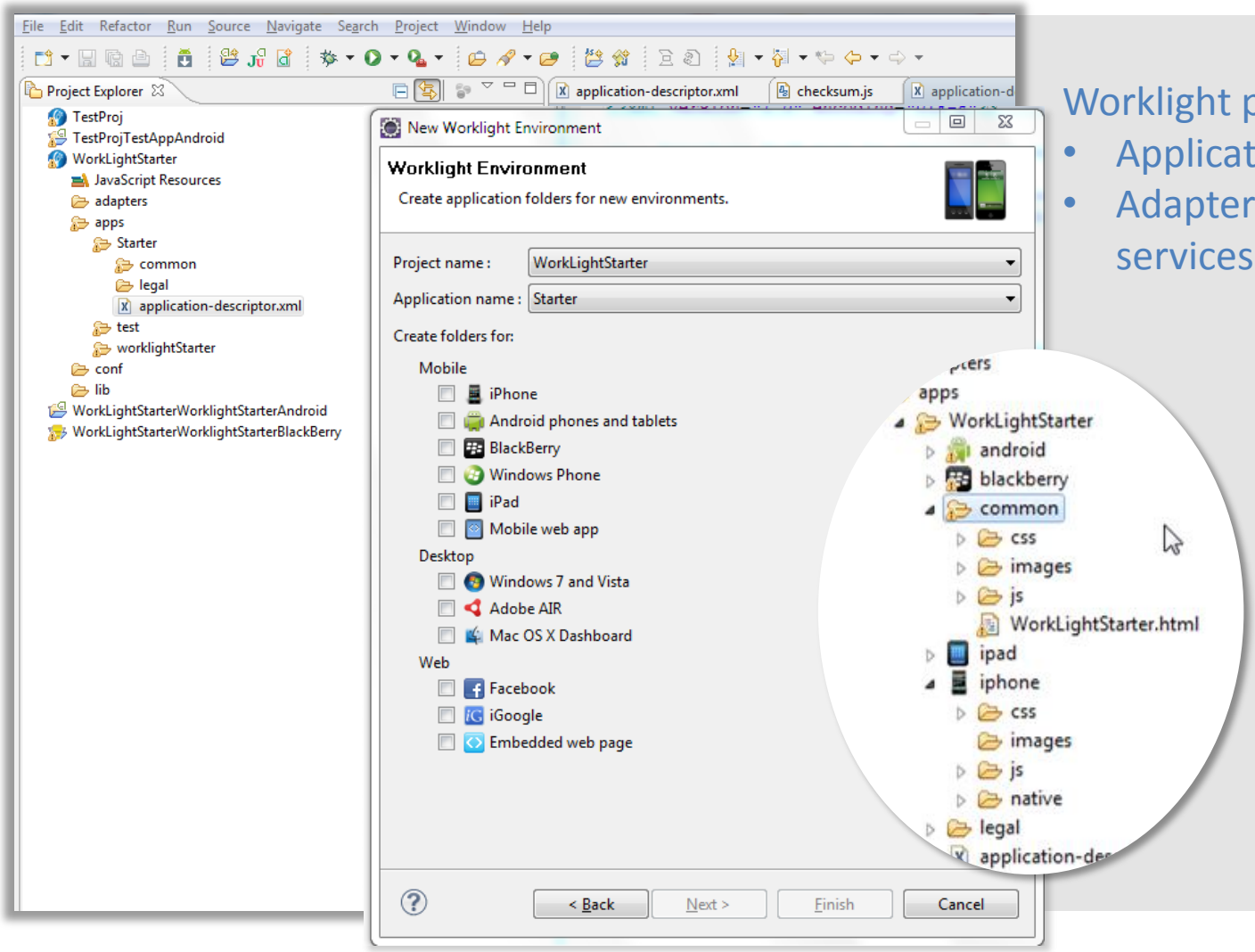
Design the UI

Tool shown: Maqetta

- Part of Dojo Foundation
- Community can run Maqetta for free (as is basis)
- Can either register or “give it a try” as temporary guest

Integrates with: IBM WorkLight

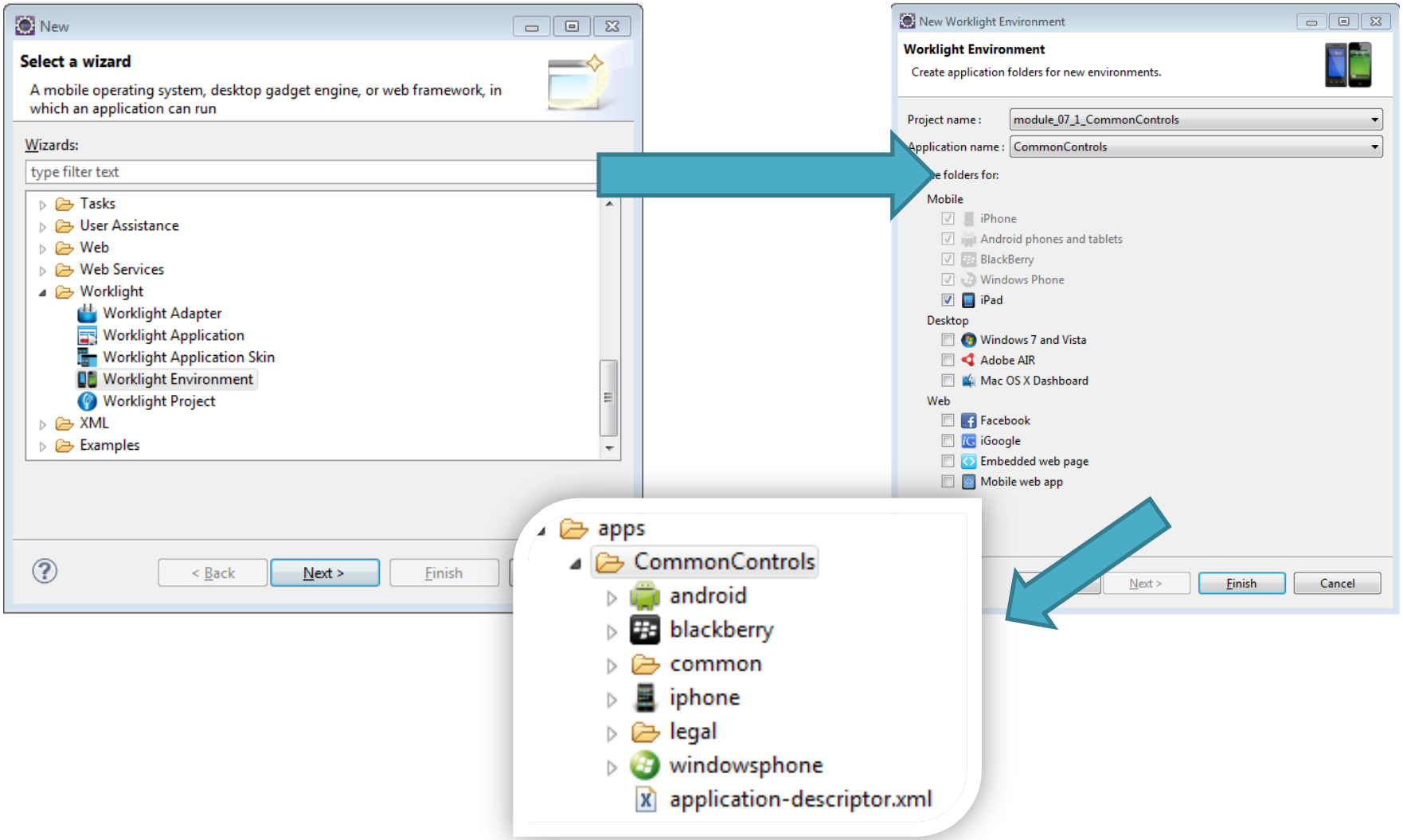
Common web codebase facilitates reuse



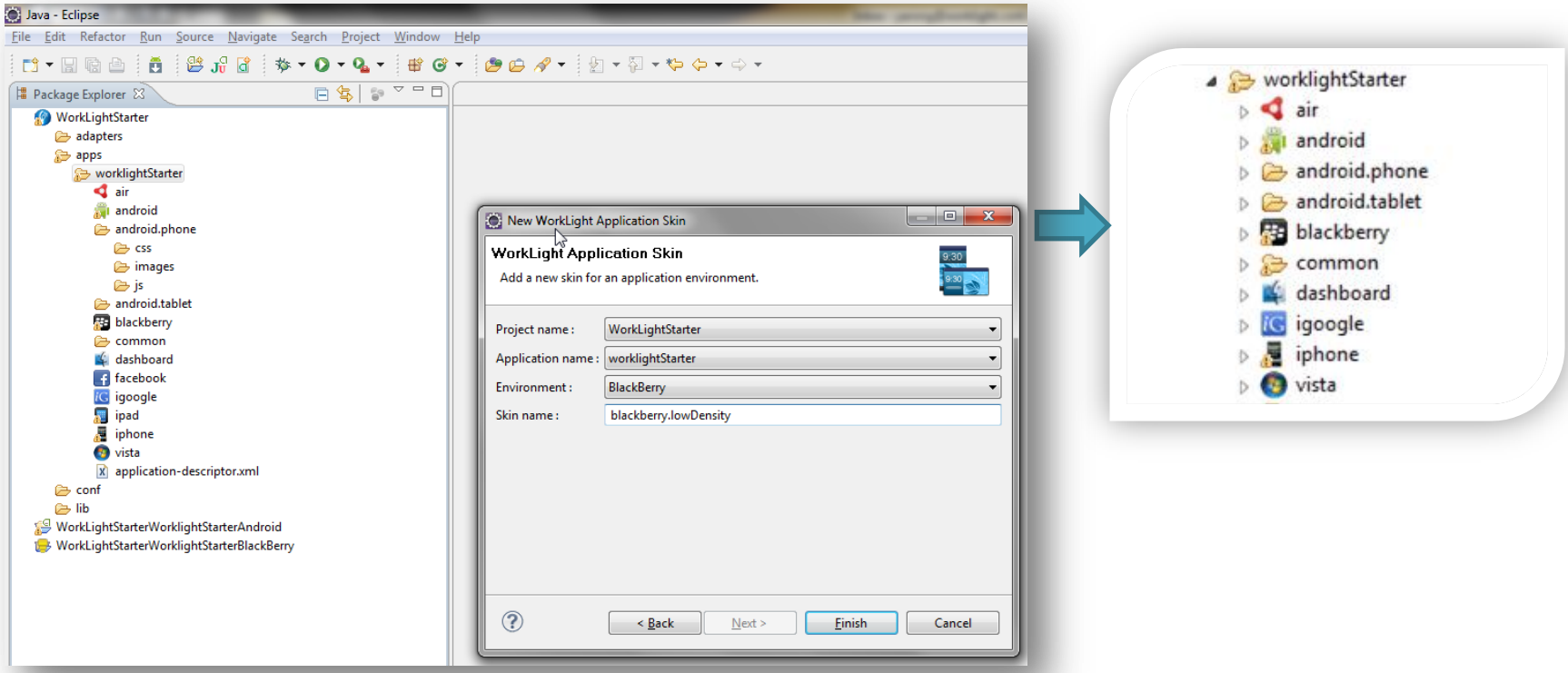
Worklight projects contain:

- Applications (mobile UI)
- Adapters (stateless services)

Add Environment

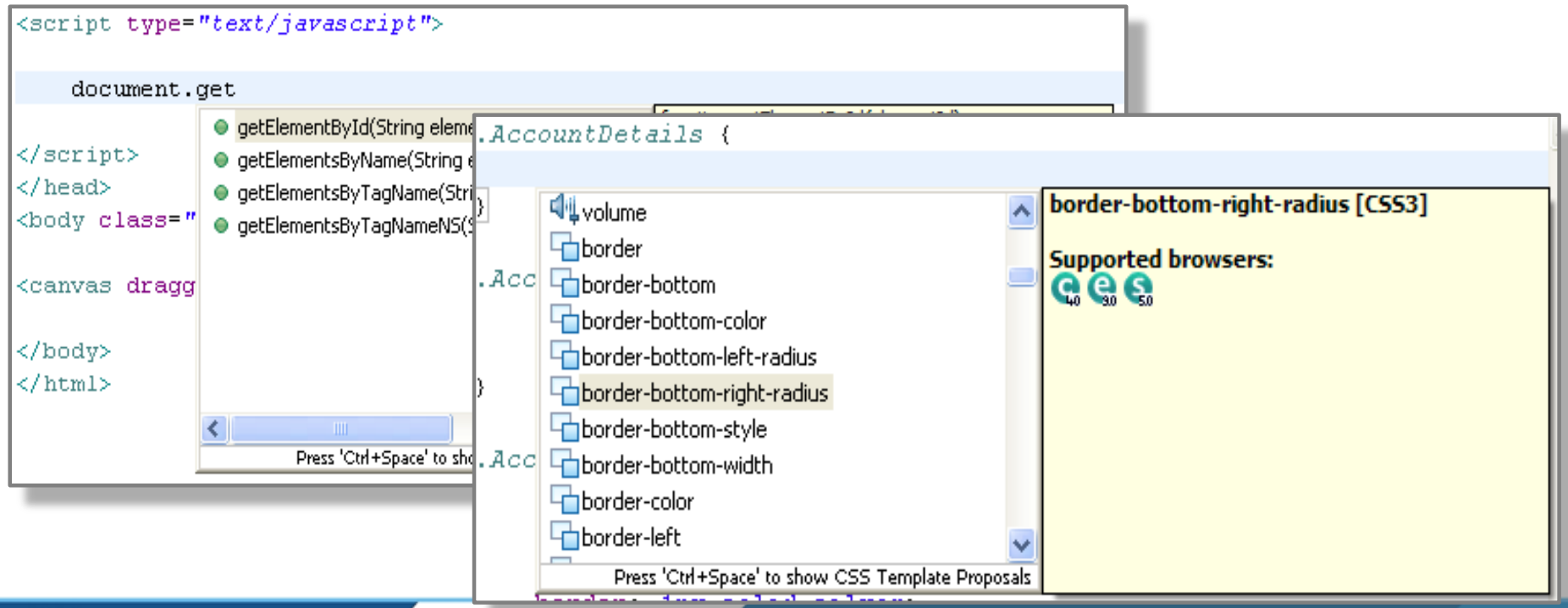


Add skins

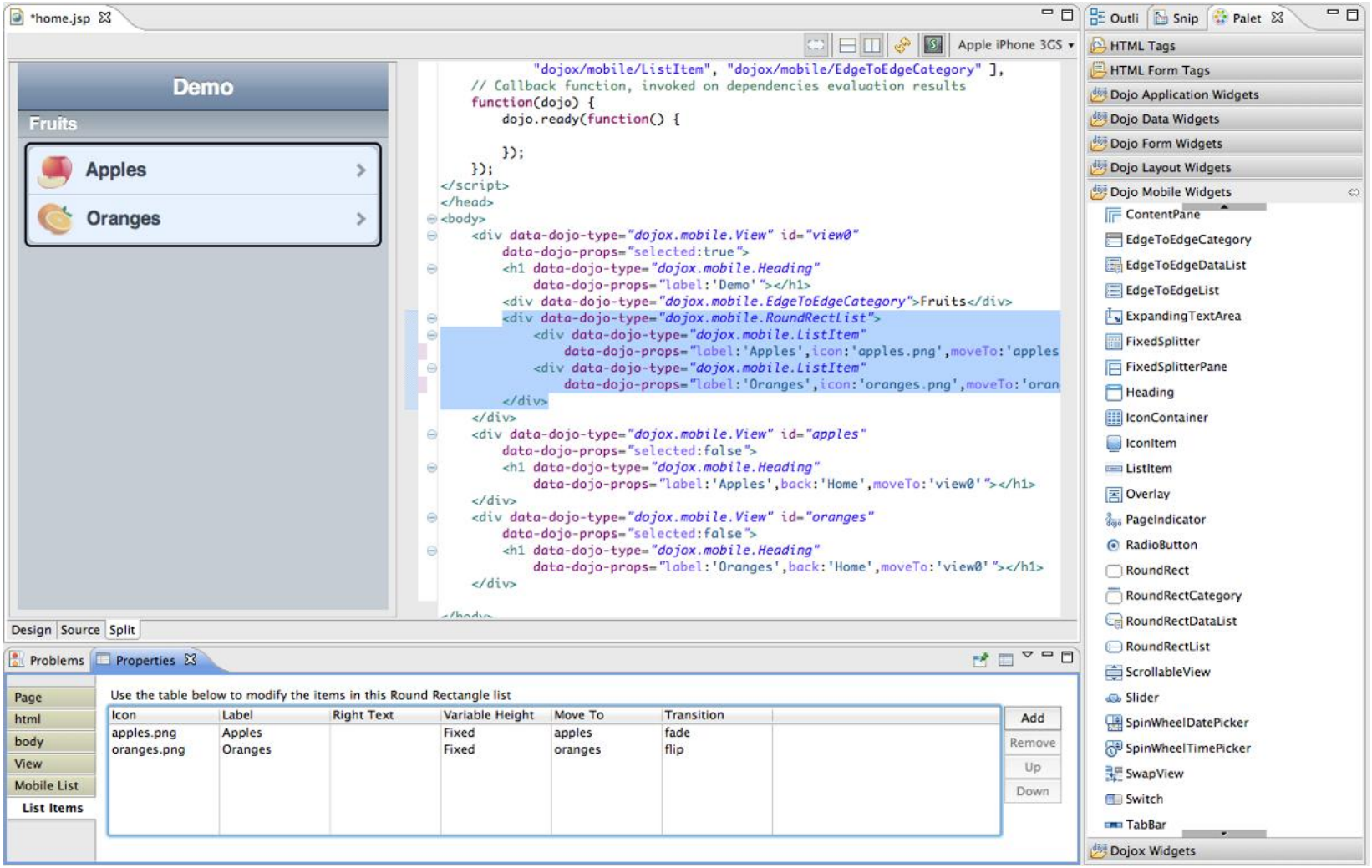

Java - Eclipse
File Edit Refactor Run Source Navigate Search Project Window Help
Package Explorer
WorkLightStarter
adapters
apps
worklightStarter
air
android
android.phone
css
images
js
android.tablet
blackberry
common
dashboard
facebook
igoogle
ipad
iphone
vista
application-descriptor.xml
conf
lib
WorkLightStarterWorklightStarterAndroid
WorkLightStarterWorklightStarterBlackBerry
New WorkLight Application Skin
WorkLight Application Skin
Add a new skin for an application environment.
Project name : WorkLightStarter
Application name : worklightStarter
Environment : BlackBerry
Skin name : blackberry.lowDensity
< Back
Next >
Finish
Cancel
worklightStarter
air
android
android.phone
android.tablet
blackberry
common
dashboard
igoogle
iphone
vista

Source editing tools

	HTML	JavaScript	Dojo	CSS	JSON
Code Assist	x	x	x	x	x
Validation	x	x	x	x	x
Outline	x	x	x	x	x

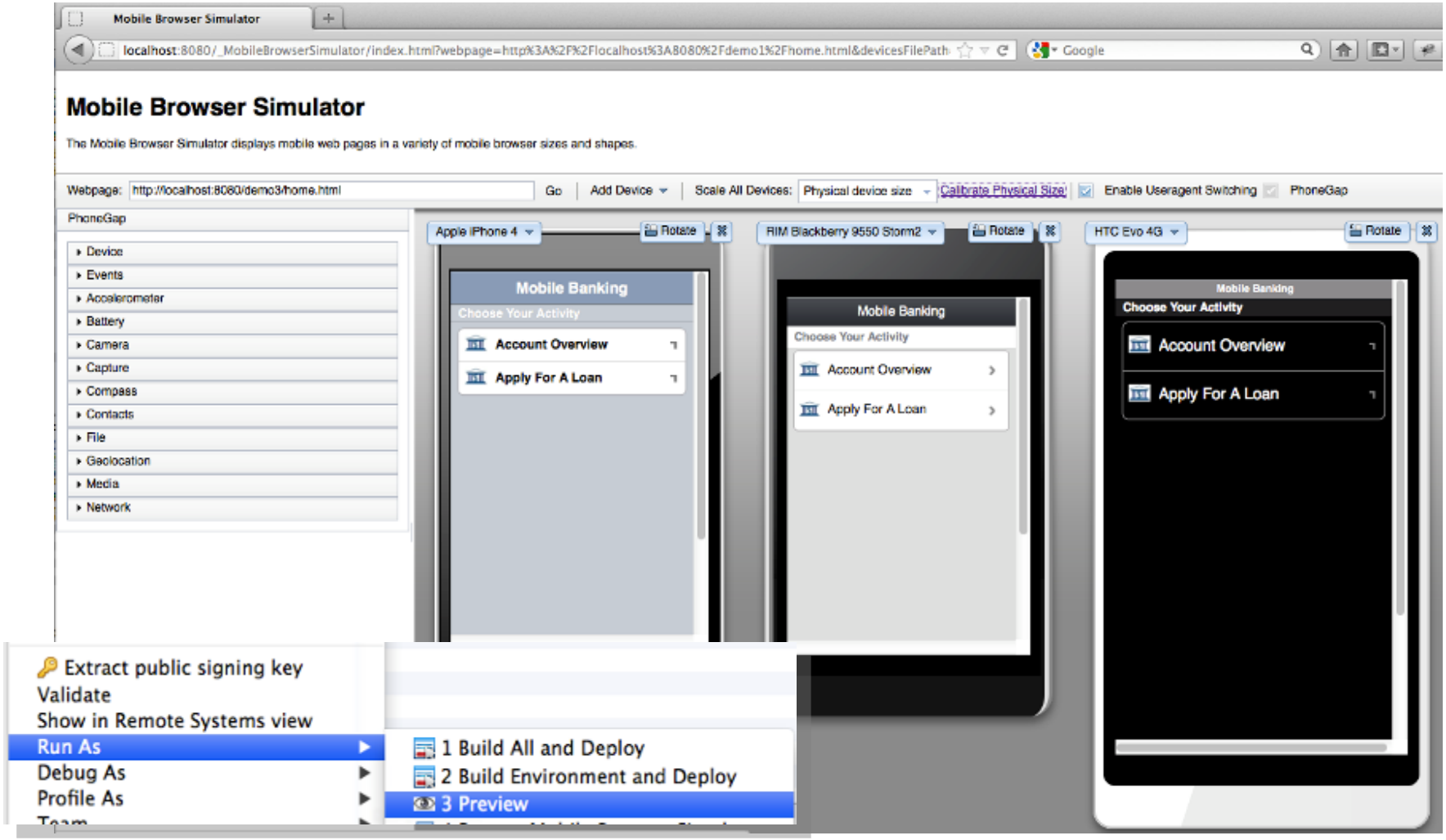


WYSIWYG UI construction



Construct Mobile UI with Rich Page Editor

IBM Worklight Studio preview feature



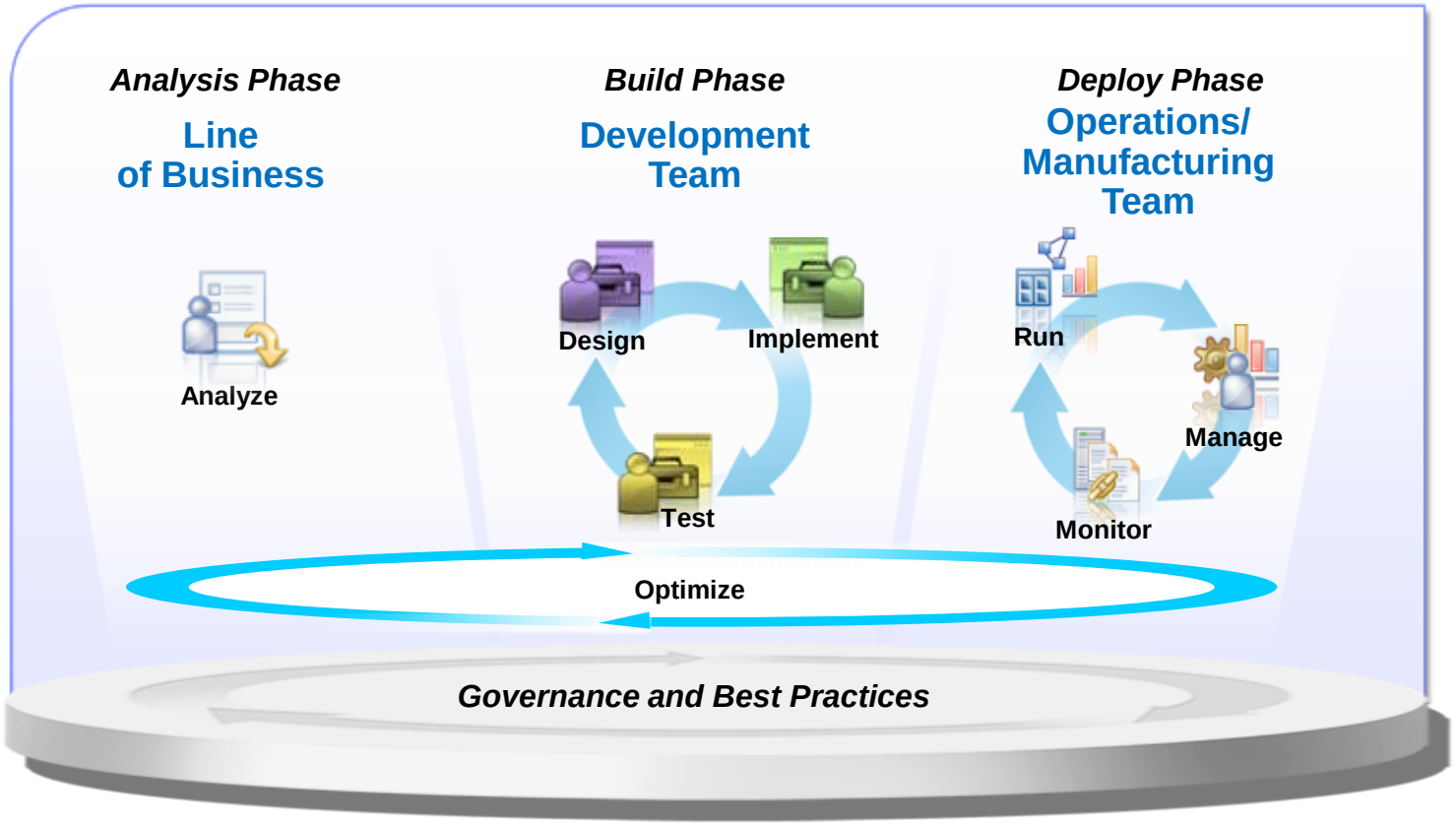
Application distribution (for development and test)

A cross platform private mobile application store similar to public app stores but focused on the needs of an organization or a team

Key capabilities:

- delivers distribution and management of mobile applications within a company / teams
- easy distribution of iOS and Android apps within a team
- provides versioning and updates
- centralizes rating and feedback information
- controls who can modify or install an application
- easy to install and simple to run

Mobile development is more than just coding ...



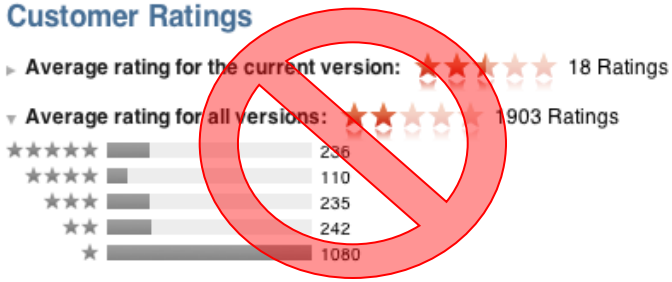
Coding is just <u>one</u> component of the mobile application development lifecycle

Challenge 2: Design and functional quality are both critical to success

- Customers demand good user experience

- Customer facing (B2C) applications
  - ‘Face of the Business’
  - Engage customer personally and drive loyalty
  - User experience is key to brand perception

- Employee facing (B2E) applications
  - Increase worker productivity
  - Speed decision making and action
  - Poor user experience compromises investment



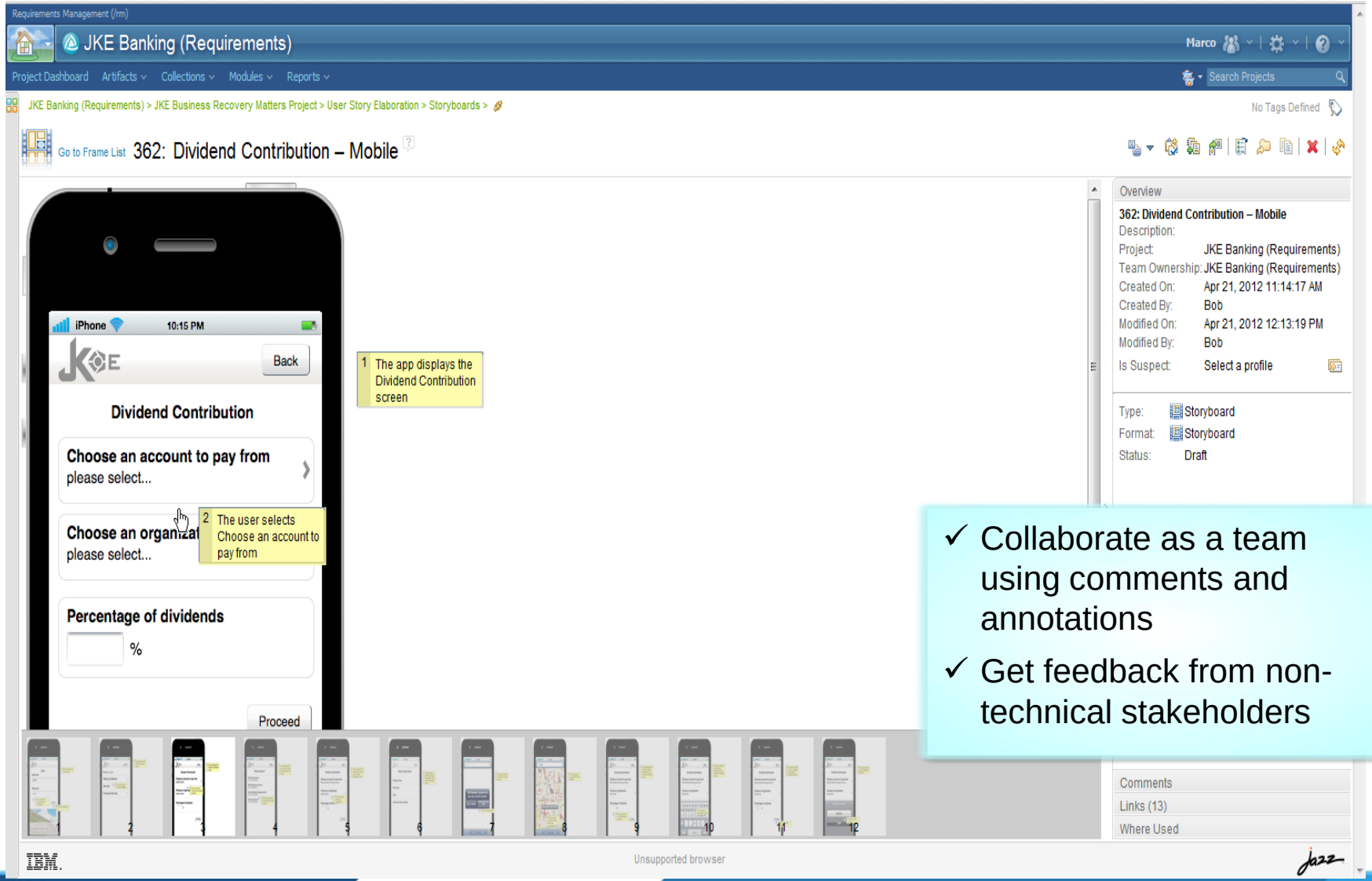
Lifecycle techniques to help optimize user experience

- **Improve collaboration** and communications between line-of-business stakeholders and development team
  - Ensure that development understands and will deliver an app that meets business objectives
  - Engage non-technical stakeholders
  - Improve collaboration to find a cheaper yet satisfying solution

- Put more focus on the **application design** and conceptualization phase
  - Iterate during the phase of the lifecycle when it is cheapest to make changes, not when the code is done and changes require drastic re-architecture

- **Use UI sketching, storyboarding, and business process diagrams**
  - Improves communications – “a picture is worth a thousand words”
  - Avoid over-elaboration with sketches; focus on high-level, big-picture issues
  - Ensure proper application flow and interactions with business process diagrams

Storyboards depict the flow of the application

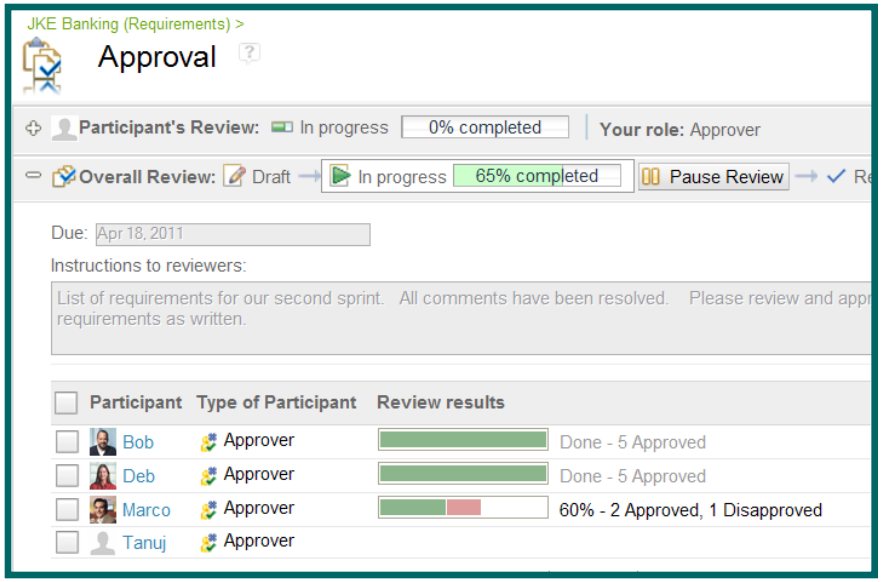


- ✓ Collaborate as a team using comments and annotations
- ✓ Get feedback from non-technical stakeholders

Formal reviews drive agreement and prevent re-work

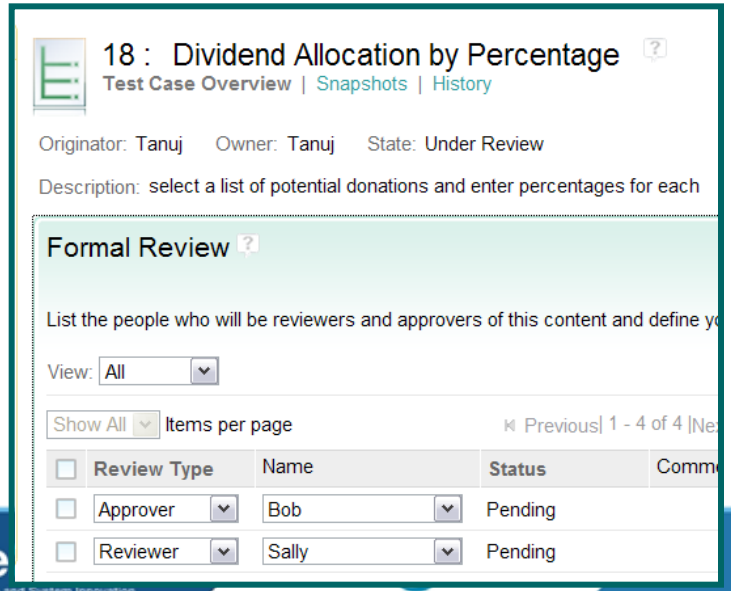
- ✓ Reviews & approvals ensures artifacts are reviewed and/or approved by key team members and captures compliance requirements.

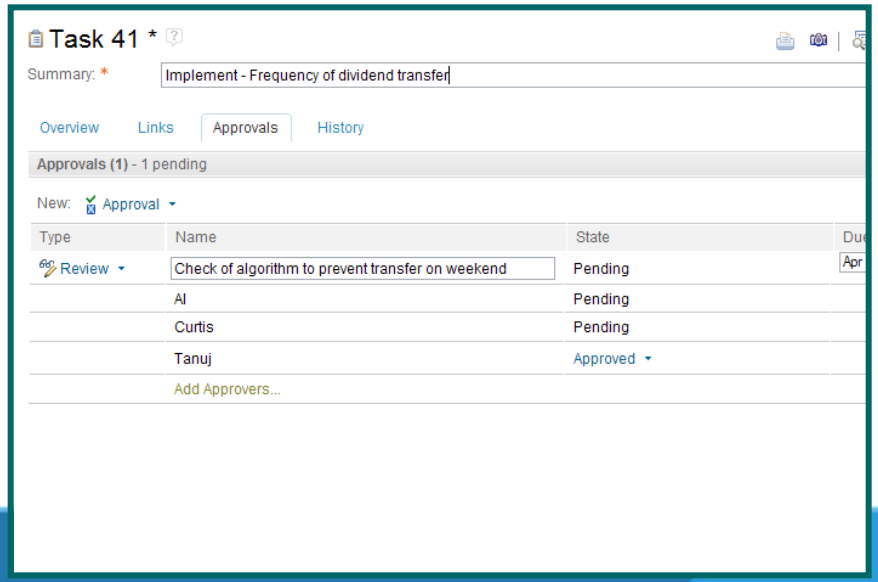
Requirements



Test Artifacts

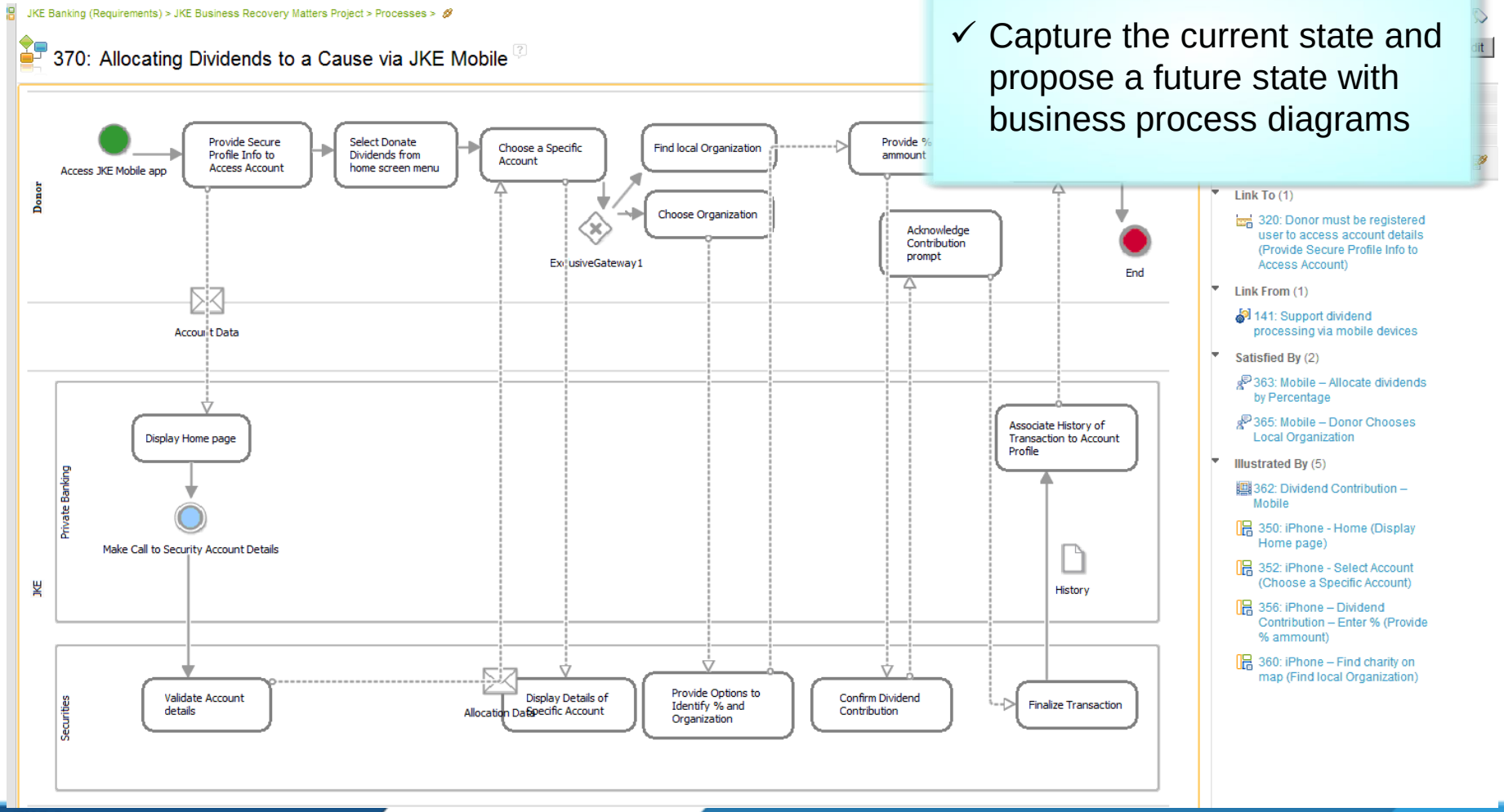
Work Items





Diagrams communicate interactions and flows

- ✓ Provide visual representation of flow and interactions
- ✓ Capture the current state and propose a future state with business process diagrams



Mobile Testing Challenges

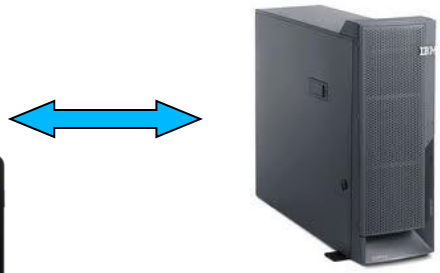
According to a study highlighted on TechCrunch, the average shelf life of an iPhone app is roughly 30 days. For free apps, less than 20% of users return to an app even one day after downloading it. And by day 30, less than 5% of users are still using it.

- Testing on emulators does not guarantee functioning on real device.
- Device environment diversity – should I buy a mobile device farm for my testing team?
- Automating testing across devices using scripts – programming skills?
- Middle tier and backend set up or simulation
- Real life testing through BETA release not possible with short time to market and low popularity unless you're a big brand.

Setting up a mobile testing infrastructure

- Request test runs on device cloud providers, such as Perfecto Mobile.
- Use crowdsourced testing services, such as µTest.
- Isolate the middle-tier and back-end layers using services such as those offered by Green Hat

Client Tier Devices



Middle Tier Server

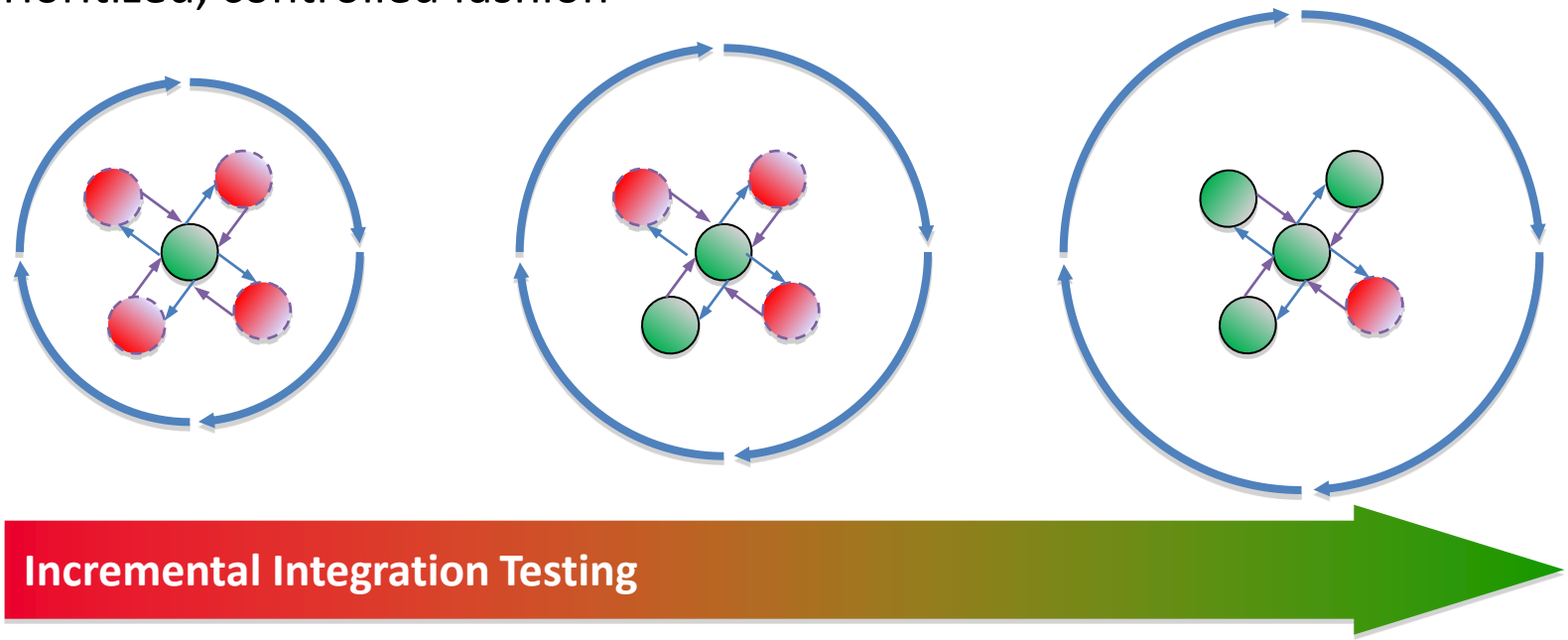
Back-end Data & Services

Green Hat Virtualization Technology

- Test Virtualization is an enabler for continuous Integration Testing
- Services, applications, systems are introduced into the continuous integration cycle in a prioritized, controlled fashion

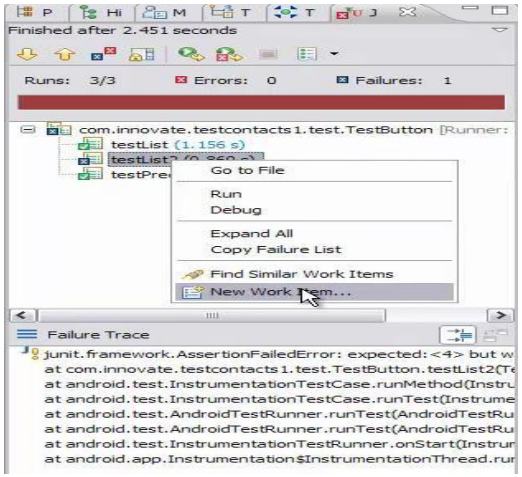
Actual Service/App

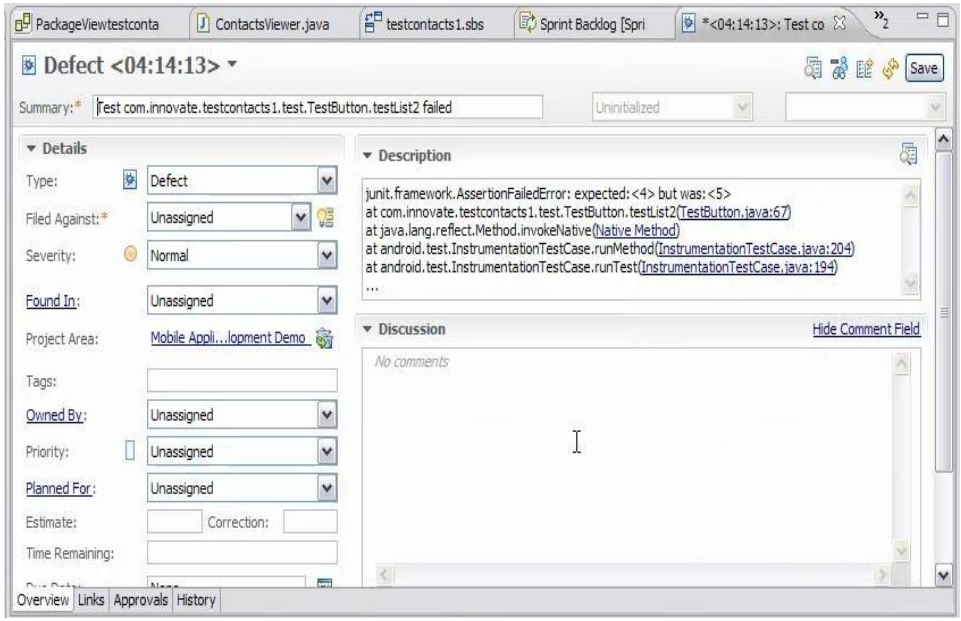
Virtual Service/App

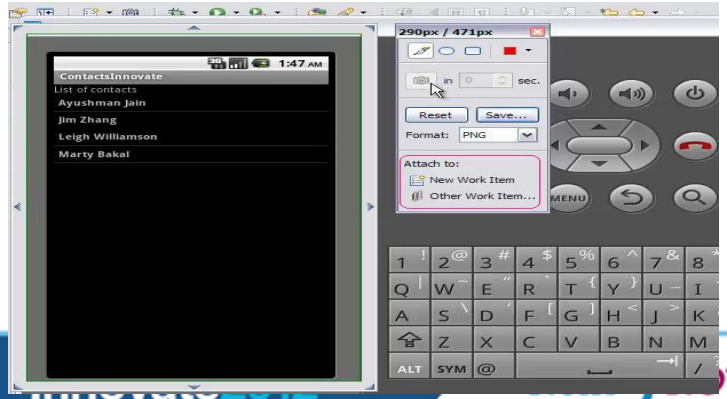


Traditional mobile testing

- Testing on emulators or browser-based simulators.
- Unit testing using Xcode for iOS and Eclipse/Eclipse-based tools for Android.







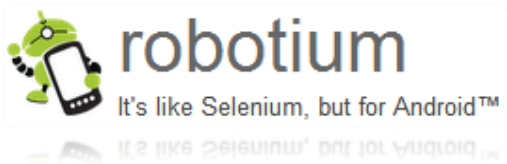
Tool shown: Rational Team Concert

Functional Testing

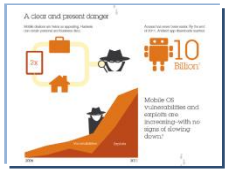
- Test basic functionality – UI appearance, procedural behaviour, placement of UI elements
- Should be done early on in the release cycle.
- Can be done manually, but automated scripts are ideal.
- Use tools that can help create test scripts or test cases in a black-box fashion.

```
solo.sendKey(Solo.MENU);
solo.clickOnText("More");
solo.clickOnText("Preferences");
solo.clickOnText("Edit File Extensions");
Assert.assertTrue(solo.searchText("rtf"));

solo.clickOnText("txt");
solo.clearEditText(2);
solo.enterText(2, "robotium");
solo.clickOnButton("Save");
solo.goBack();
solo.clickOnText("Edit File Extensions");
Assert.assertTrue(solo.searchText("application/robotium"));
```



Security Testing



Real threats, right now

Loss and theft

1 in 20 mobile devices were stolen in 2010.[5]

Malware

In 2011, mobile device users saw a

155%

increase in malware across all platforms.[5]

Google Android malware grew

400%

from June 2010 to January 2011.[5]

Spam

70% of mobile device spam is fraudulent financial services.[6]

Wifi

Wifi hotspot are set to increase

350% by 2015[5]

providing more opportunities for "man-in-the-middle" attacks.

Security Testing

- Static analysis of mobile app.
  - Confidentiality - Integrity
  - Authentication - Authorization
  - Availability - Non-Repudiation
- Manual penetration testing
  - Cross-Site Scripting - SQL Injection
  - Denial of Service - Buffer Overflow
- Search for vulnerabilities, especially in the web code and XSS, SQL and other common operations.

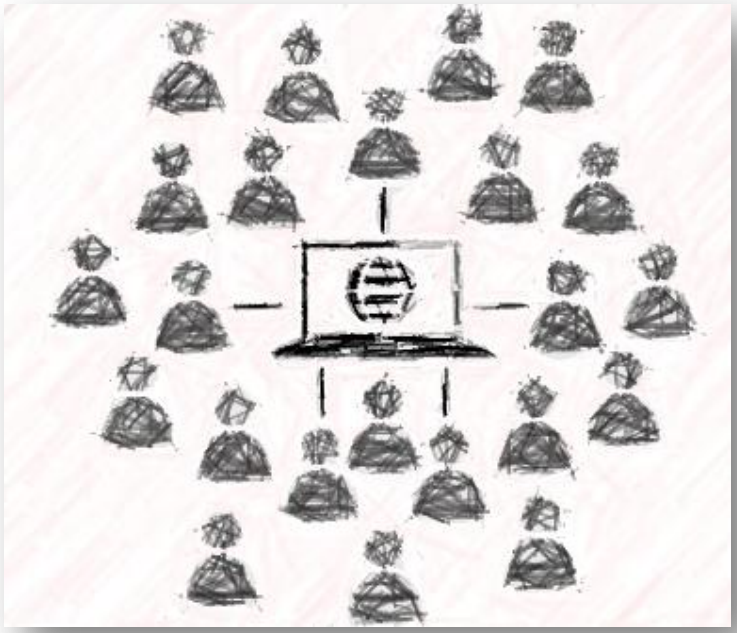
IBM Worklight and IBM Appscan offer unique features to plug security holes

Usability Testing

- User experience is an important part of mobile applications.
- A good user experience on iPhone doesn’t guarantee one on Android.
- Different screen sizes and resolutions need to be tested.
- For mobile web applications, behaviour on different mobile browsers need to be tested.

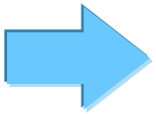
Load testing

- LIVE: Get people from across the world to simultaneously test your app.
- SIMULATION: Use tools to create simultaneous sessions and stress test your app.
- Can be combined with the other forms of testing.
- Cannot be done in-house.
- BETA release can invite live load testing from early adopters.
- Crowdsourcing



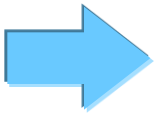
What does a mobile tester need?

- **Test management**
  - Planning, tracking, etc.
  - Manual testing capabilities
  - Integration into broader collaborative lifecycle



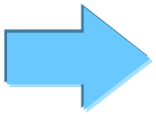
Rational Quality Manager (RQM)

- **Automation**
  - Device agnostic test cases
  - Multi-target test cases
  - Interaction with device-specific capabilities
  - Virtualization of middle-tier and back-end systems



Third-Party automated mobile testing integrated with RQM. Green Hat Virtualization.

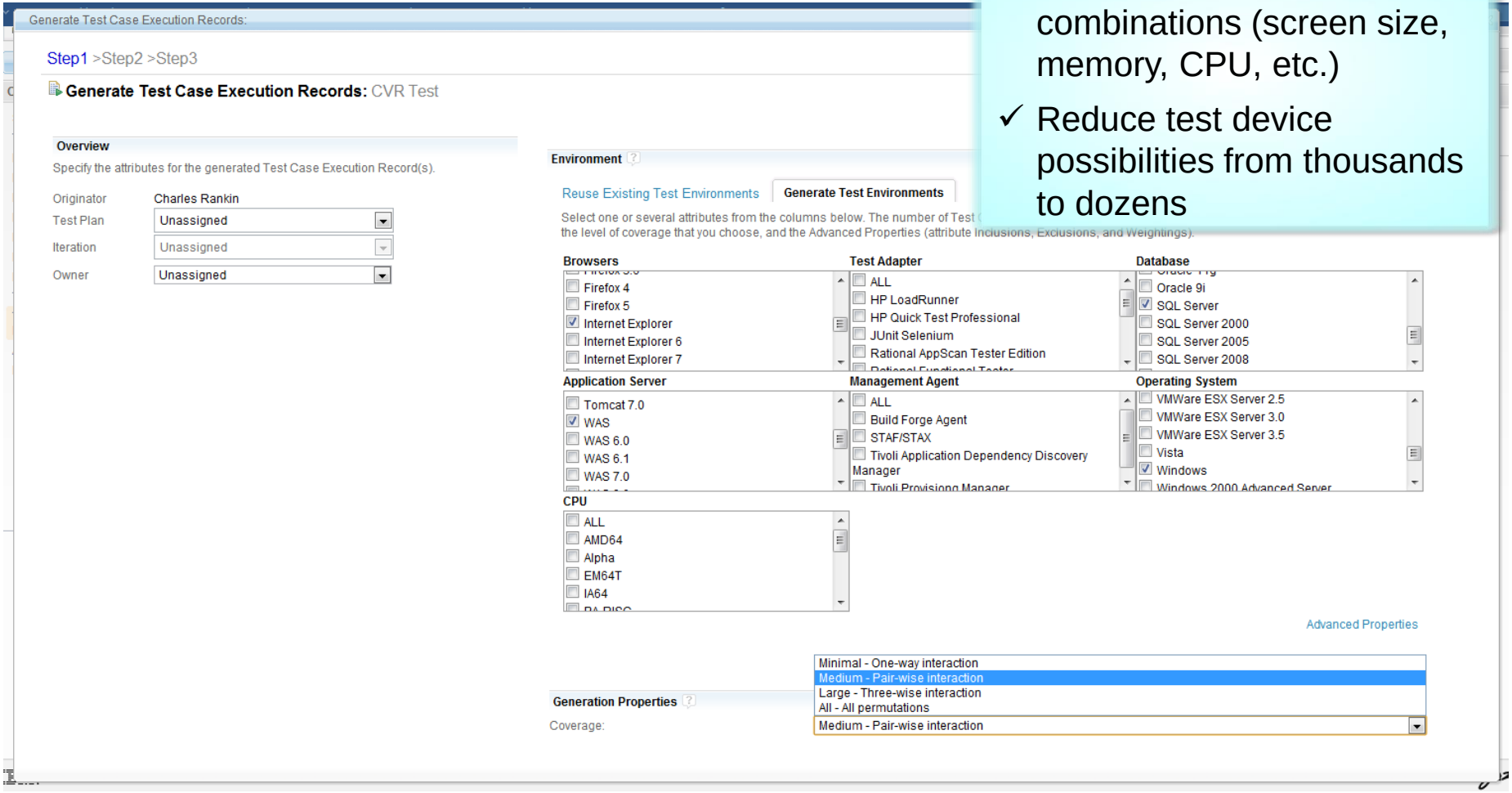
- **Access to a diverse set of devices**
  - Platforms
  - Manufacturers
  - Form factors
  - Carriers



Third-party mobile device-cloud services

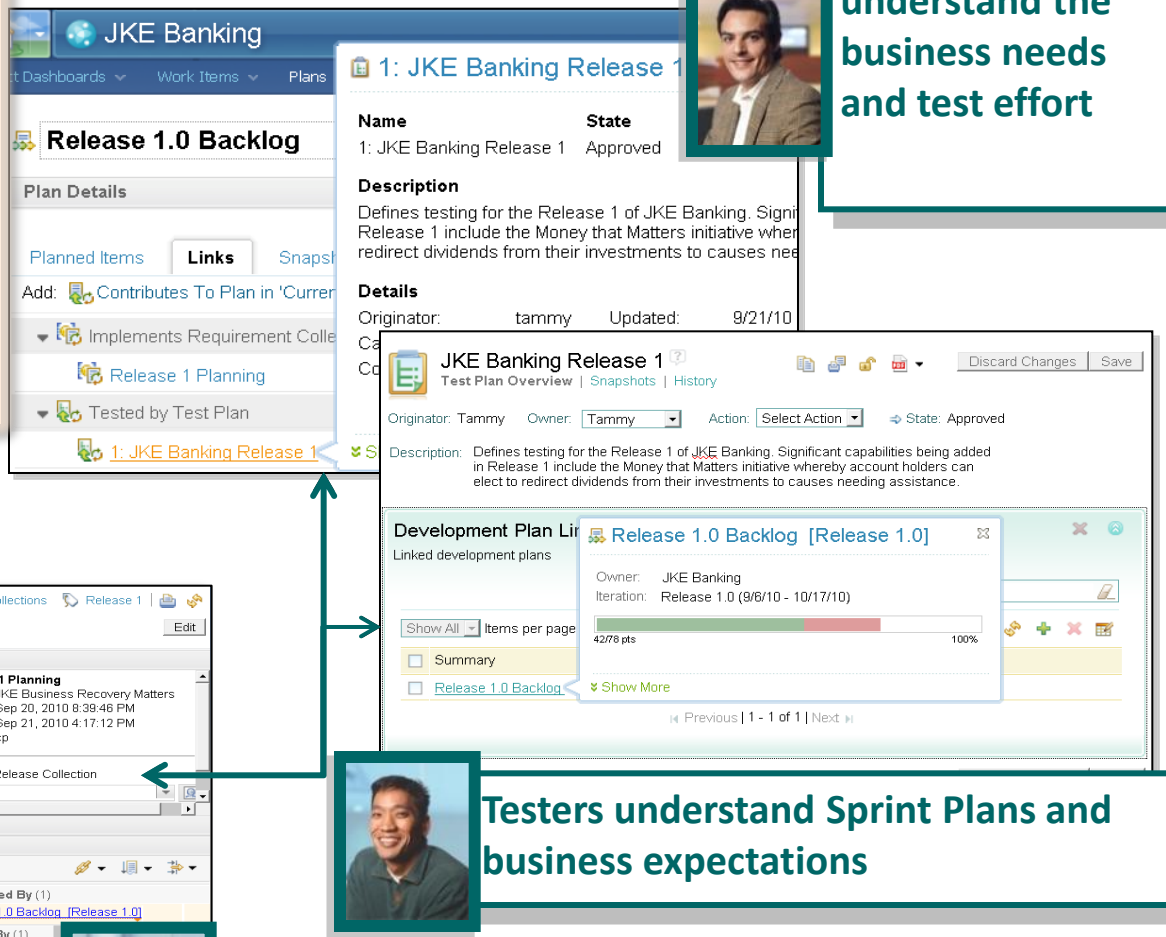
Test environment optimization

- ✓ Generate an optimized set of device characteristic combinations (screen size, memory, CPU, etc.)
- ✓ Reduce test device possibilities from thousands to dozens



Test integrated fully into the process

- ✓ No wasted effort – development is qualitative and aligned to the agreed upon requirements at the right time
- ✓ Quality Assured – test teams know exactly what requirements and functionality have and haven't been tested
- ✓ Whole team buy-in improves team trust, efficiency and focus



Developers understand the business needs and test effort

Testers understand Sprint Plans and business expectations

Requirements owners clarify the business needs in a collection

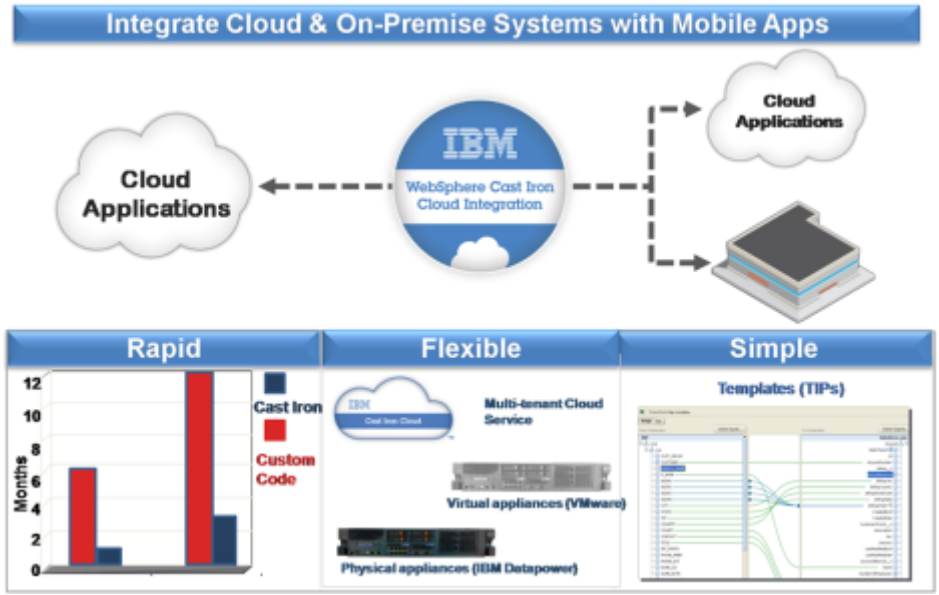
Challenge 3: Integrating with existing systems

- Mobile applications need to connect to enterprise back-end data and services
- Existing programs and services may need to be modified for the mobile app
- Multiple skills will be involved, responsible for different parts of the mobile application

Rapid, simple & flexible connectivity for mobile apps

WebSphere Cast Iron Cloud integration

Simple and flexible integration for all connectivity projects, allowing you to rapidly integrate SaaS and back-end systems with mobile apps



Client Challenge

Simplified and cost effective mobile integration to back-end systems and cloud

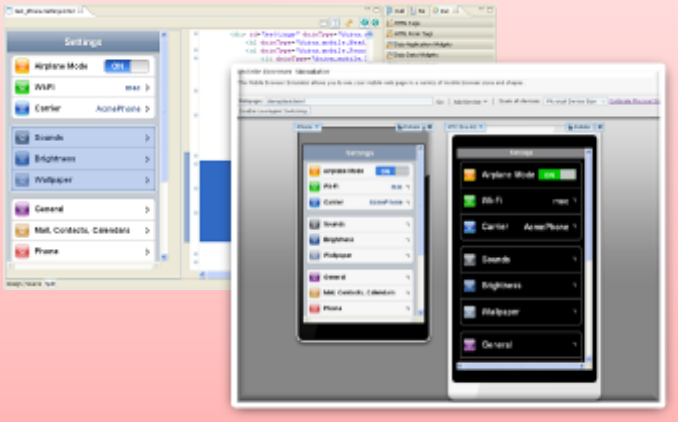
Key Capabilities

- Native connectors and template integration processes to connect mobile apps to backend & cloud systems
- Bidirectional connectivity and business logic
- Centralized monitoring
- Simple and flexible, user-friendly, wizard-based, “configuration, not coding” architecture

IBM Integrated Development Environments with IBM Worklight

Extend existing back-end services and data to mobile apps

Integrated multi-platform development environments



Construct, debug, and test mobile user interfaces

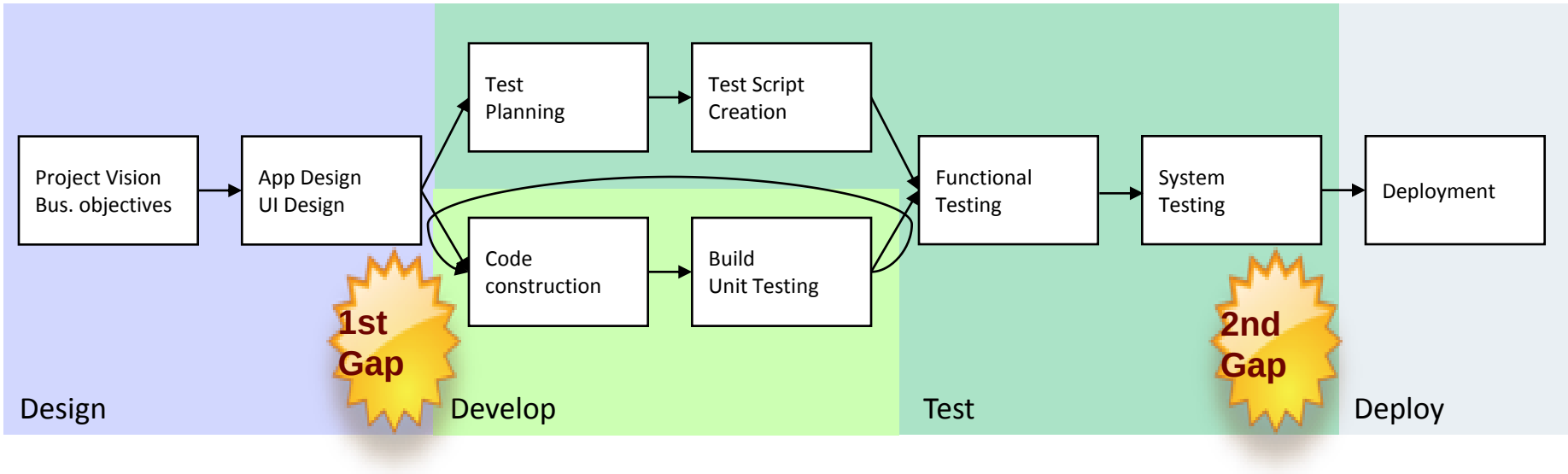
Refactor and extend existing logic on enterprise platforms (System z, Power) as mobile-consumable services

Challenge 4: Meeting tight time-to-market requirements

Mobile is pushing traditional delivery approaches to the breaking point

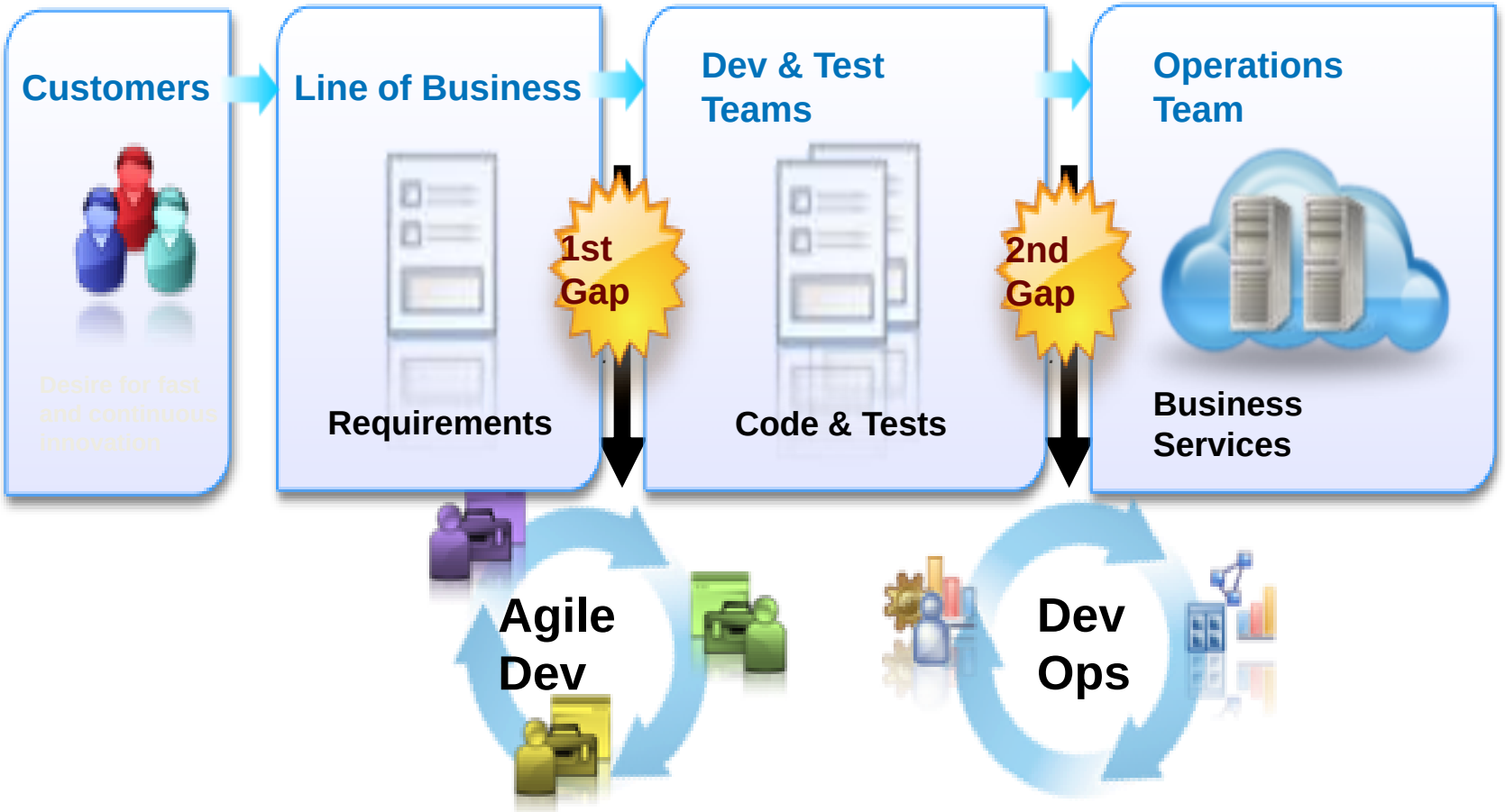
	Mobile Apps	Desktop Apps
Time-to-market	Weeks to Months	Months to Years
Frequency of updates	Once every several weeks	12-18 month cycles

Factors affecting project velocity

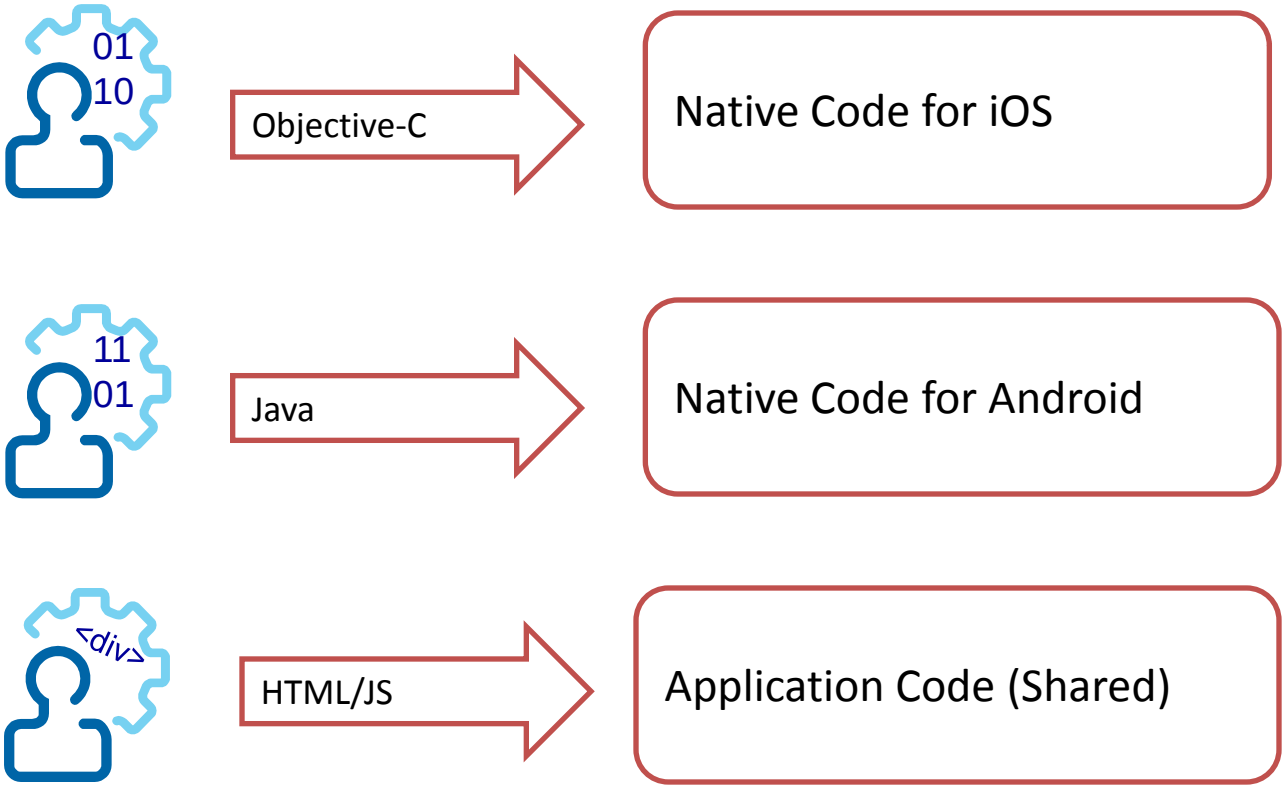


- There are 2 key factors affecting project velocity:
- **Gap 1:** amongst Line of Business, Development and Test teams (ALM)
  - Late rework due to misalignment of stakeholders
  - Slow progress due to hand-off errors and delays between team roles
- **Gap 2:** between Development/Test and Operations Team (DevOps)
  - Slow cycle/iteration times due to DevOps challenges

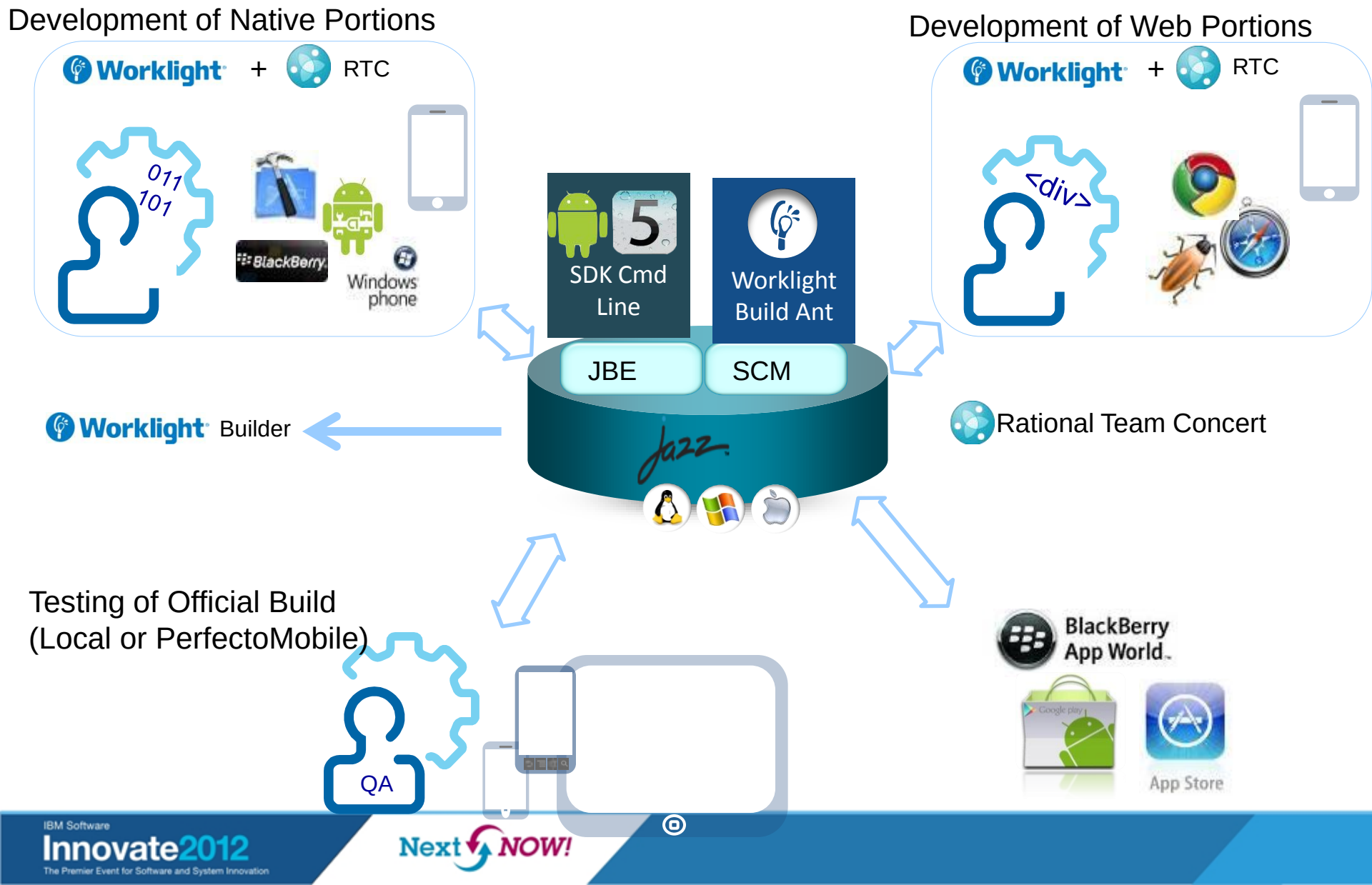
Addressing application lifecycle management gaps



Hybrid development requires multiple tools and skillsets



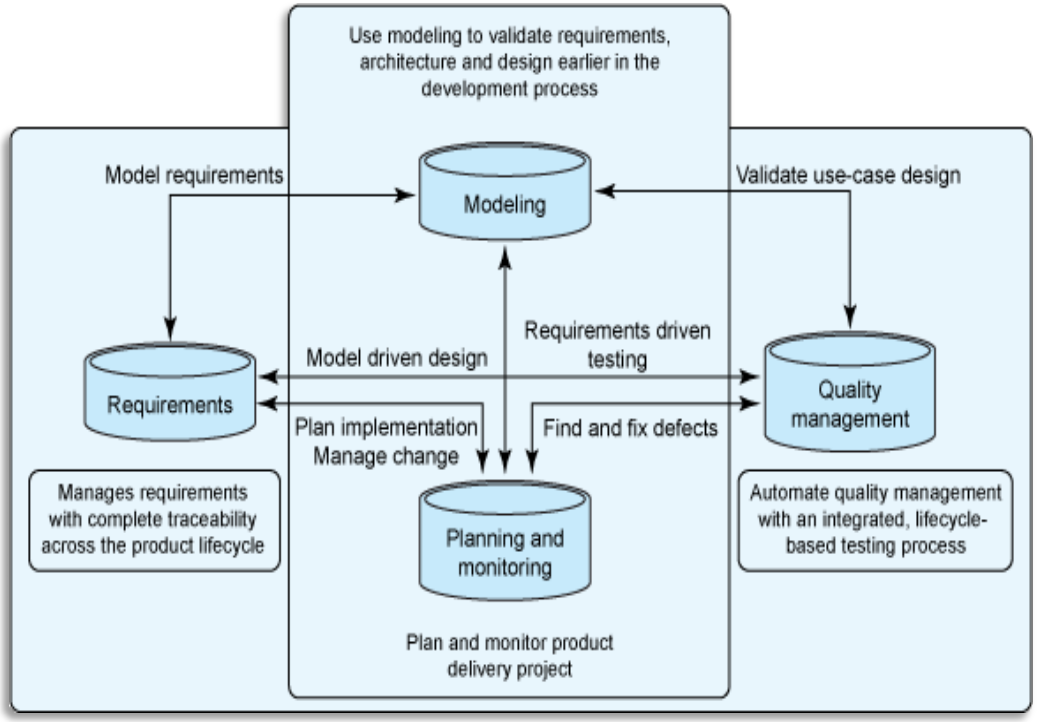
IMF + Rational CLM allows teams of specialists to collaborate



Back to the future!

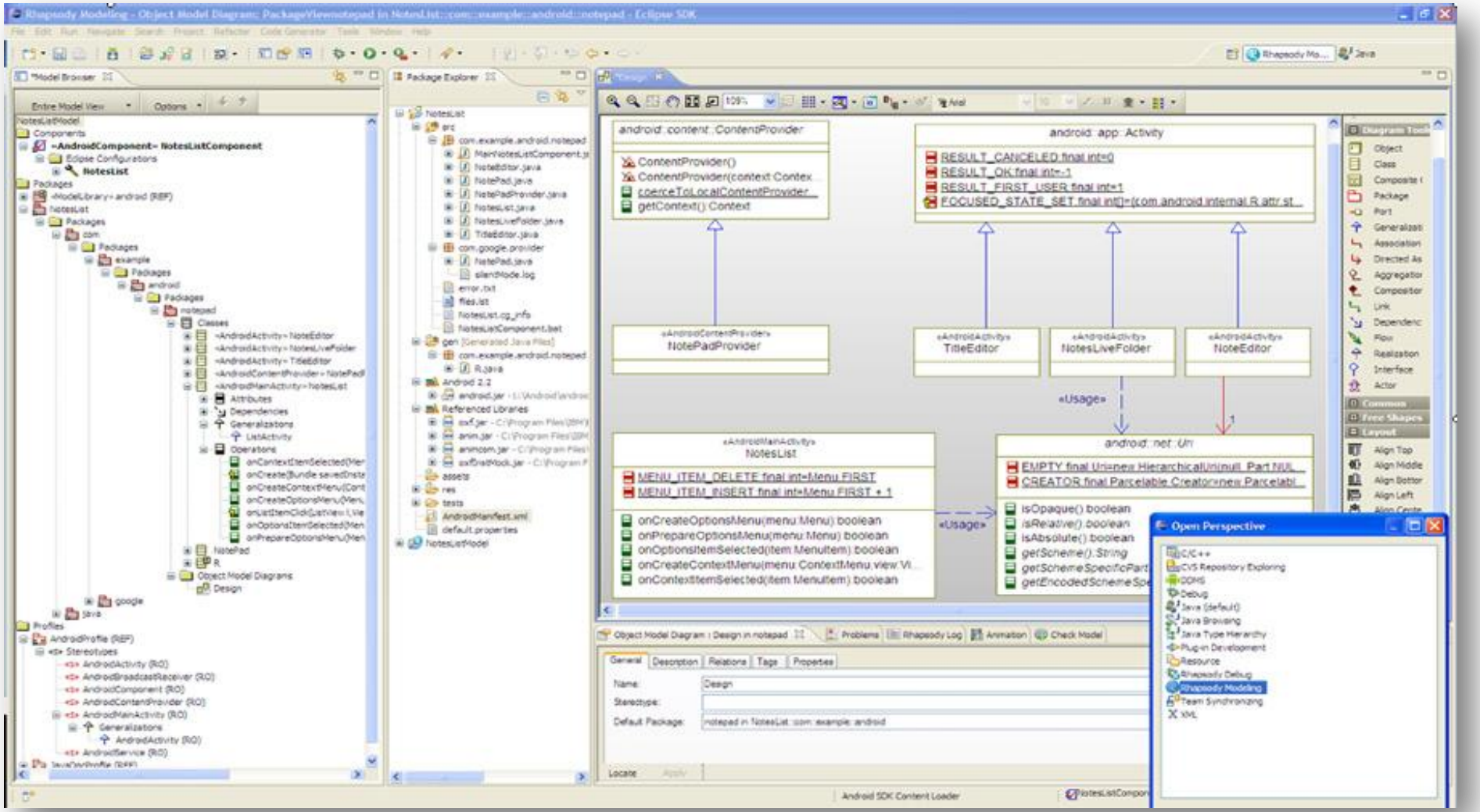
Model Driven Development of Mobile Applications

- Early design and architecture of application, consumable by developers.
- Visualize the system with semantic information.
- Connect software development to requirements, testing and planning.
- Quickly create a visual representation of an app to communicate its value to multiple stakeholders.

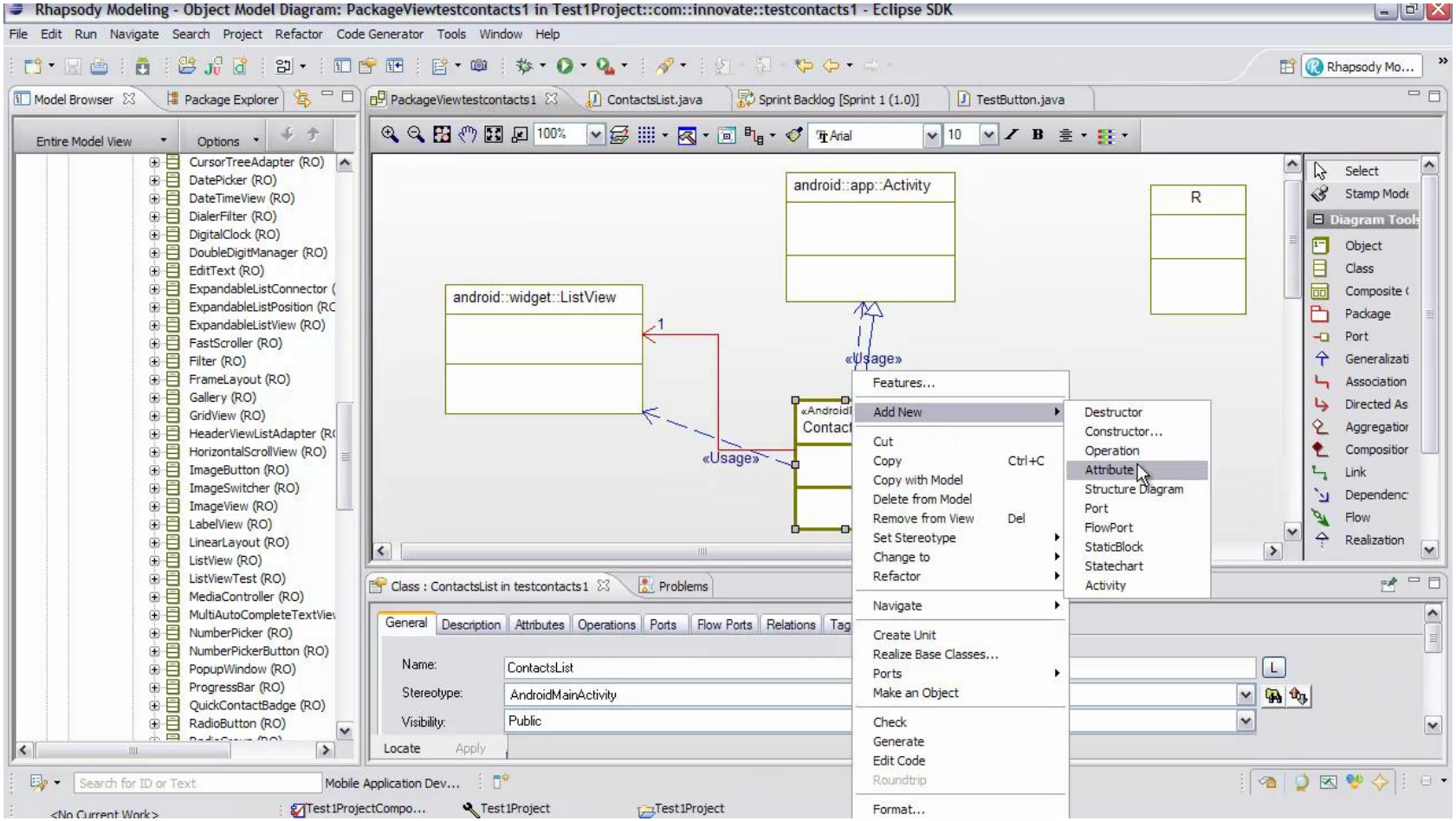


IBM Rational Rhapsody enables MDD of Android applications

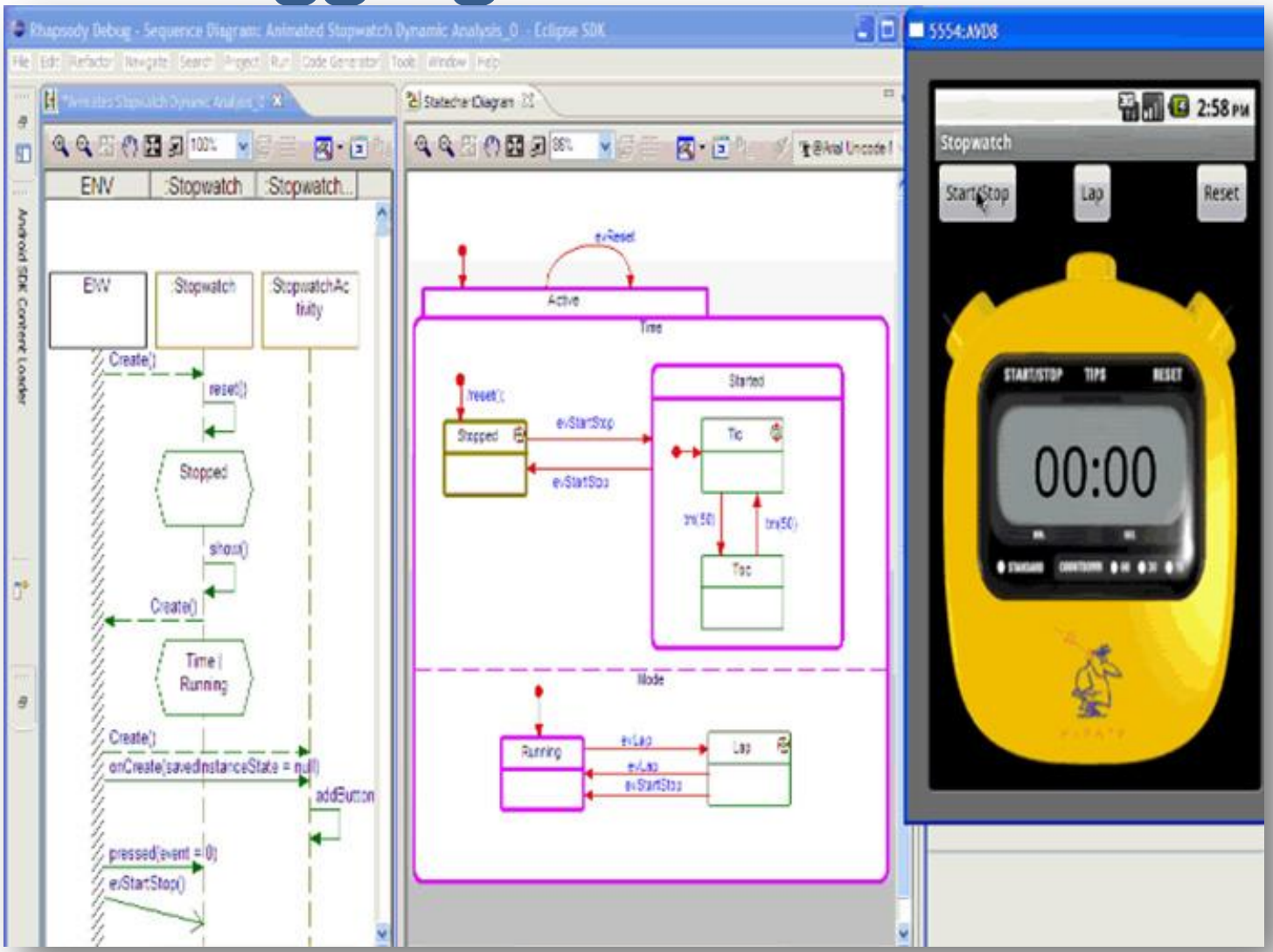
Visualizing an android app as UML diagrams



Round-trip code generation

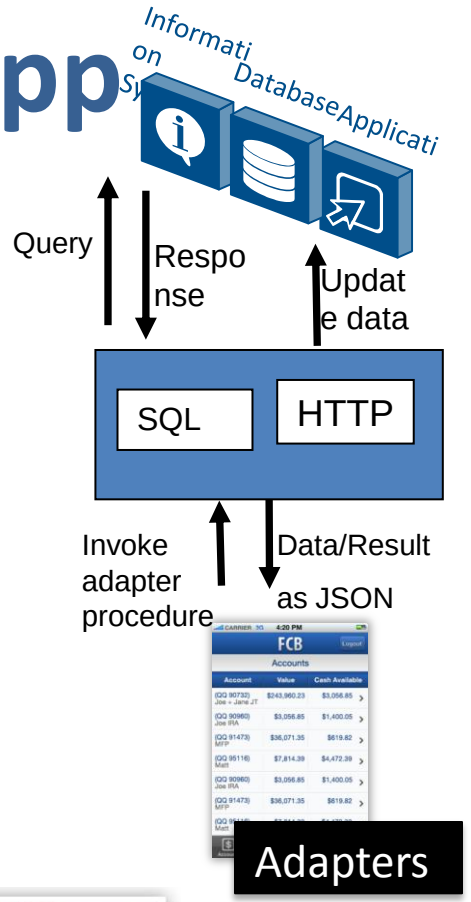


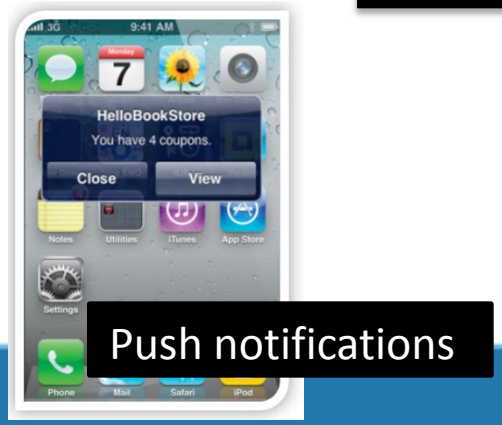
Debugging at the model level



Monetize your app

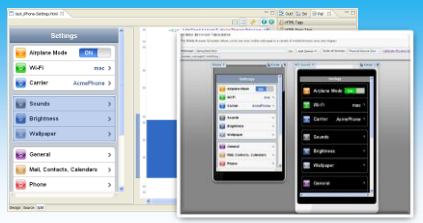
- Use SDKs of ad networks such as Google Admob, InMobi, etc.
- Leverage tools such as IBM Worklight to incorporate ads into the common code of your app and deploy to all platforms.
- For in-house advertising or ad mashups, use Worklight adapters.
- Use push notifications to send advertisements, coupons, etc. in a controlled fashion.





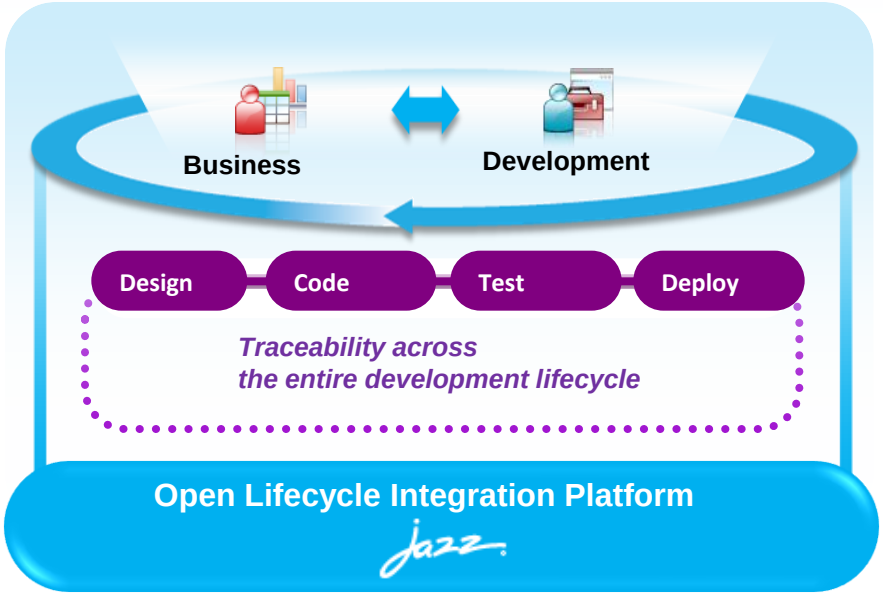
Aligning teams across the development lifecycle

Collaborative Lifecycle Management, Rational IDEs, and Worklight



Construct, debug, and test mobile UIs

Refactor and extend existing logic as mobile-consumable services



End-to-end Lifecycle Management for Mobile Application Development

Client Challenge

Mobile apps are typically multi-tiered and require collaboration between multiple teams, including teams responsible for design, development, test, and deployment

Key Capabilities

- Common, integrated tool set across all phases of development and components of the mobile solution
- Integration with Worklight Studio to ensure developers have access to plans, tasks, builds, and code from within their development IDE
- Traceability across the entire mobile application development lifecycle – all teams are aware of changes (for example, a changing requirement)

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