

DIG 4104C: WEB DESIGN WORKSHOP

Mobile Development: HTML5 v. Native

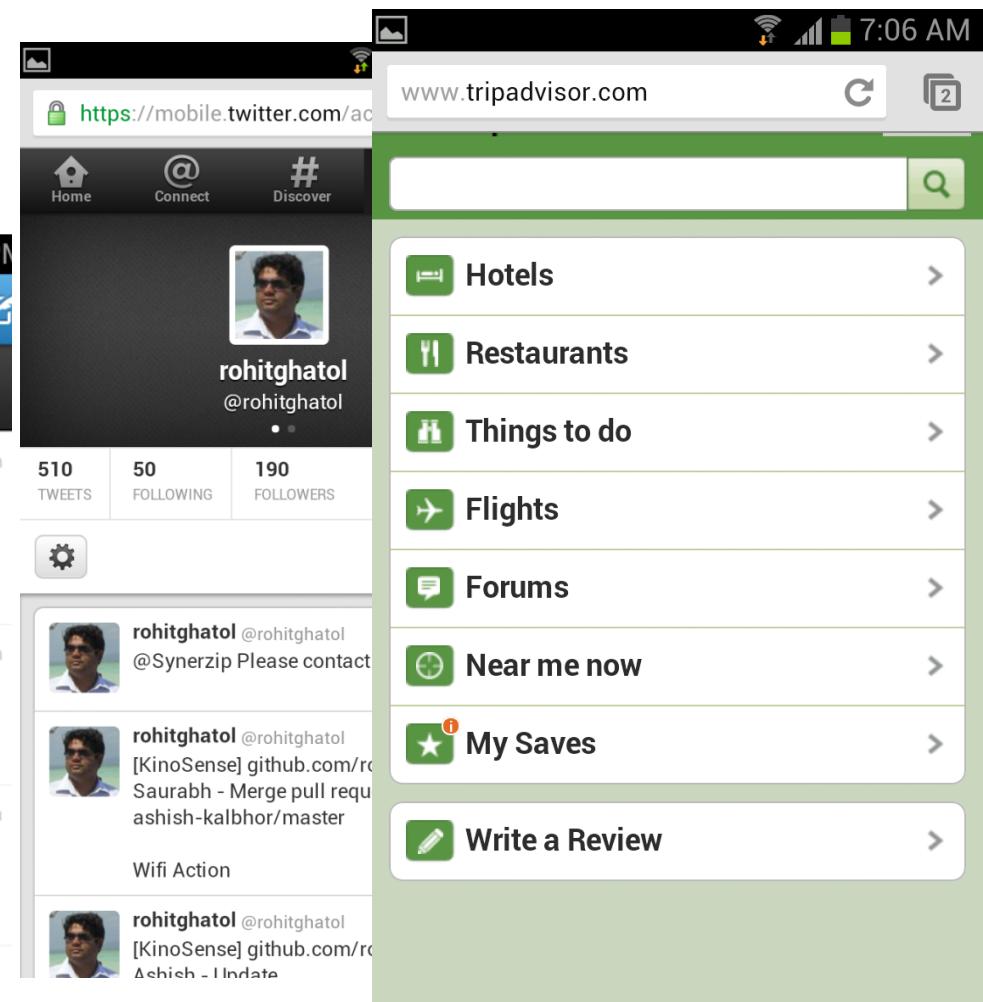
Summer 2015

D. Novatnak

MOBILE DEVELOPMENT

HTML5 v. Native

Mobile Apps

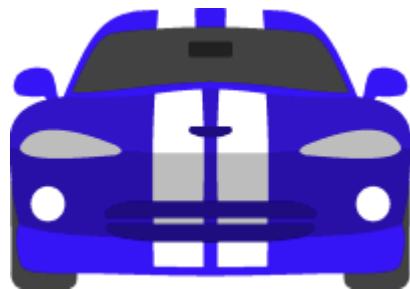


Topics

- Expectations from Mobile Apps
- Types of Mobile Apps
- Hybrid Case Study
- When to choose which route?
- What tools are available?

Expectations from Mobile Apps

Driving a
Car



= Native App

Car Pooling



= Hybrid App

Public
Transit



= HTML5 App

Rich Mobile Experience

- **Levels of rich mobile experience**

- Level 0 – No Change for Mobile, web app just accessed via mobile browser
- Level 1 – Mobile-Friendly Web App/Site
- Level 2 - HTML5 Mobile App
- Level 3 - Hybrid Mobile App
- Level 4 - Native Mobile App

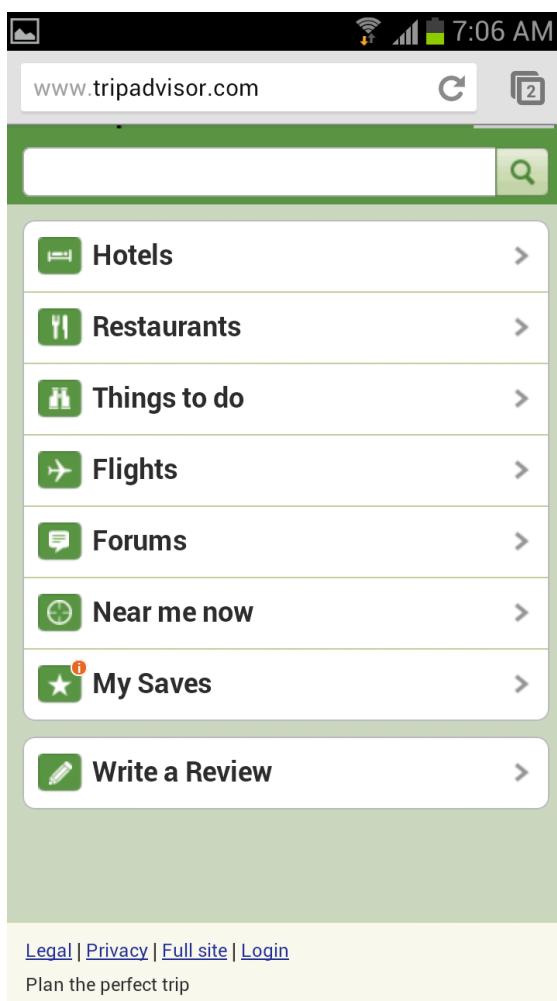


Today's Focus

Types of Mobile Apps

- HTML5
- Native
- Hybrid (HTML5 + Native)

HTML5 Mobile App



HTML5 OVERVIEW

Twitter - Desktop Vs Mobile

The screenshot shows the Twitter desktop interface. At the top, there's a header with links for Home, Connect, Discover, Me, and a search bar. Below the header is a user profile for **rohitghatol**, showing 510 tweets, 50 following, and 191 followers. A "Compose new Tweet..." button is present. The main area displays a feed of tweets from various accounts, including TechCrunch, Engadget, BlackBerry India, Sushrut Bidwai, Arvind Kejriwal, and Rajeev Chandrasekhar. On the left sidebar, there are sections for "Who to follow", "Trends", and "Browse categories".

The screenshot shows the Twitter mobile application running on an Android device. The top status bar indicates the time as 7:13 AM. The app interface is similar to the desktop version, featuring a user profile for **rohitghatol** at the top. Below the profile are sections for tweets and trends. The tweet feed on the right shows posts from the same accounts as the desktop version, such as TechCrunch, Engadget, and Arvind Kejriwal. The overall layout is designed for a smaller screen, with some desktop-specific features like the sidebar removed.

HTML5 App Overview

HTML5 Apps run inside a Browser and cannot make use of many things that Mobile OS provides, like File System, SQLite Database, Network APIs, Camera, Contacts etc.

A few APIs are exposed to browser JavaScripts like GeoLocation, very limited local storage, and more.

<http://m.twitter.com>

Browser App

~~Mobile~~ OS

File System

SQL-Lite

Network

Camera

GeoLocation

Contacts

Accelerometer

Native APIs

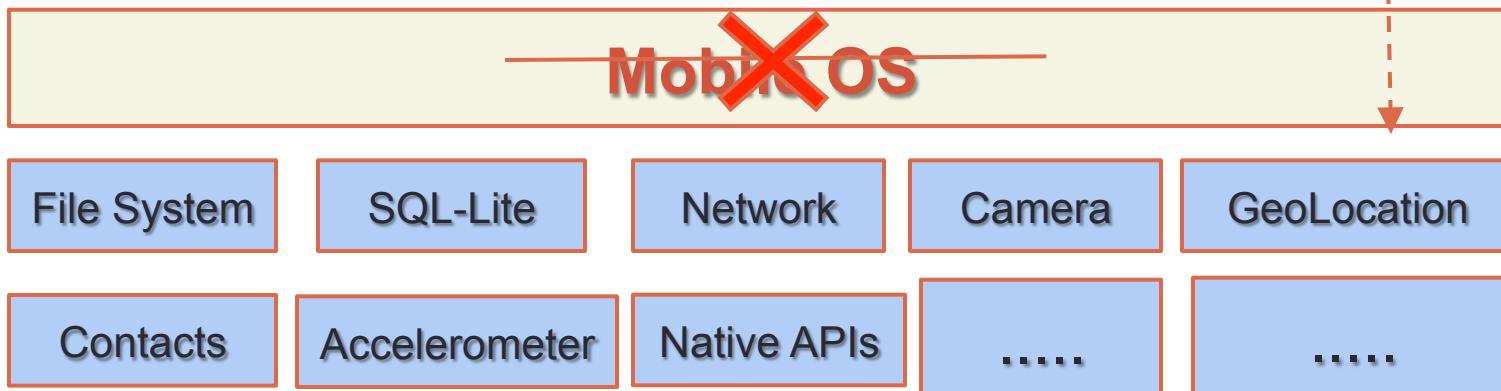
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HTML5 FEATURES

HTML5 App Capabilities

- Some HTML5 Capabilities include:
 1. GeoLocation
 2. Audio/Video Tag
 3. Canvas/SVG
 4. Local Storage
 5. Web Workers
 6. Web Sockets



HTML5 PROS

The good

HTML5 Pros

- Lowest Development Cost
- Maximum Reuse
- Use Same team
- No App Store Distribution hassles
- Instant Updates, Clients on latest Version

HTML5 CONS

The not so good

HTML5 App Limitations

An HTML5 App runs as long as a browser is running. HTML5 Apps start only when a user starts them; no native-like background processing is available.

<http://m.twitter.com>

Browser App

~~Mobile OS~~

File System

SQL-Lite

Network

Camera

GeoLocation

Contacts

Accelerometer

Native APIs

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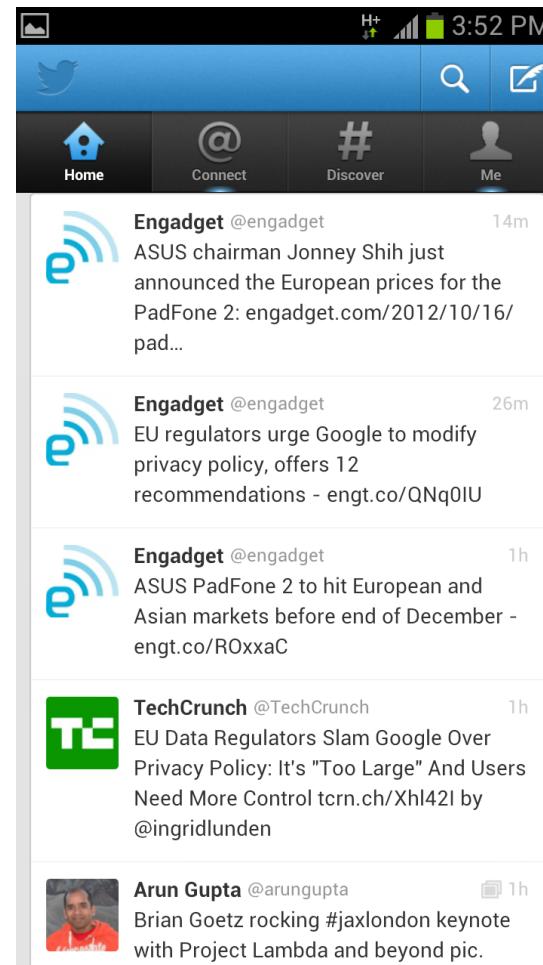
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HTML5 Cons

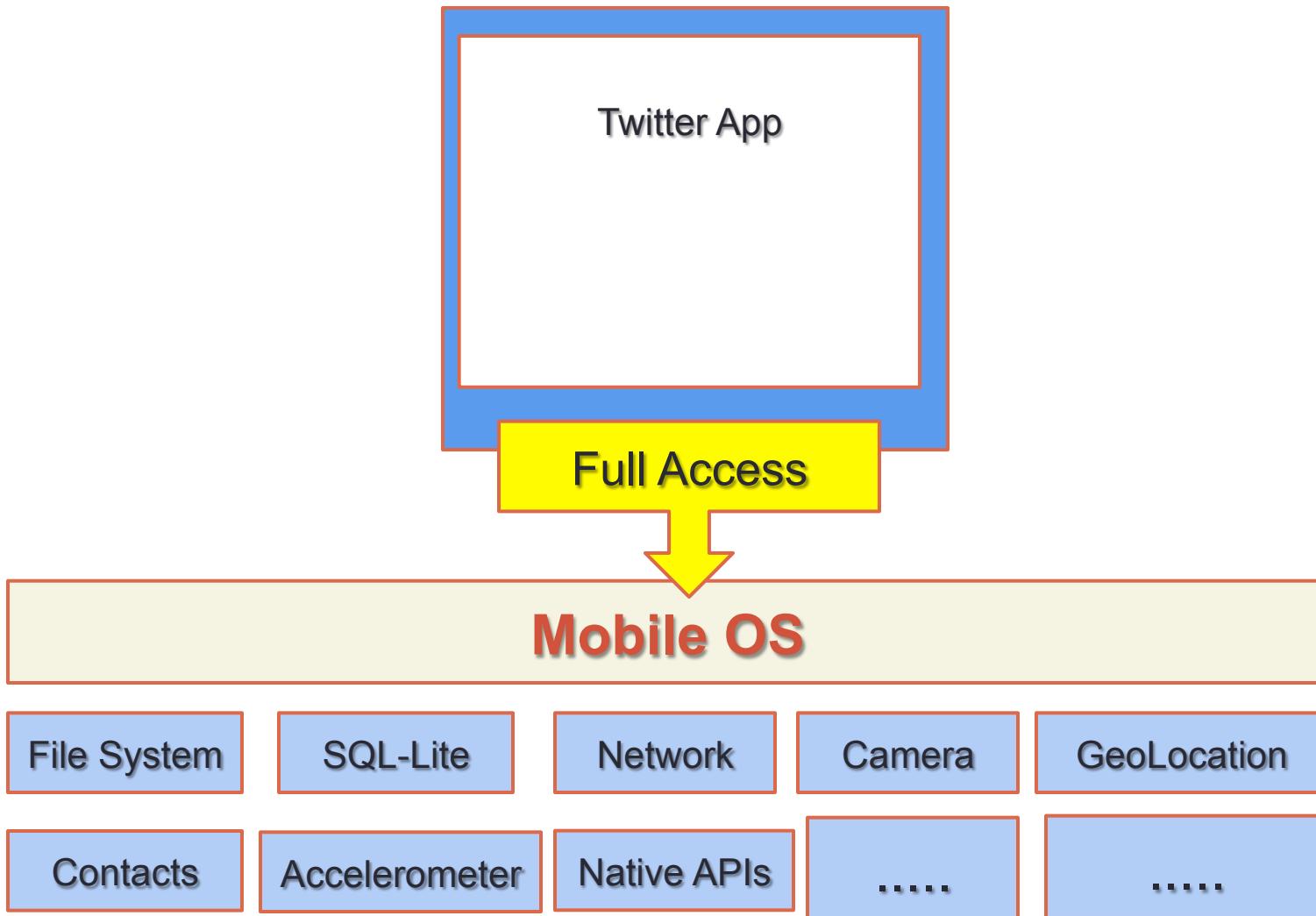
- User needs to open browser
- Loading time is slowest
- No notification available for updates
- Limited access to Phone Features
- App Store Marketing not available
- HTML5 Fragmentation
- Simulation of Native UX

NATIVE APP OVERVIEW

Native App



Native App Overview



NATIVE APP PROS

The good

Pros

- Prowess of Mobile is available
- Ability to build Richest & Fastest Apps
- Notifications Available
- Offline Storage Available
- Background Processing Available
- Entire Device Sensor Array Available
- App Store/Market Monetization Possible

NATIVE APP CONS

The not so good

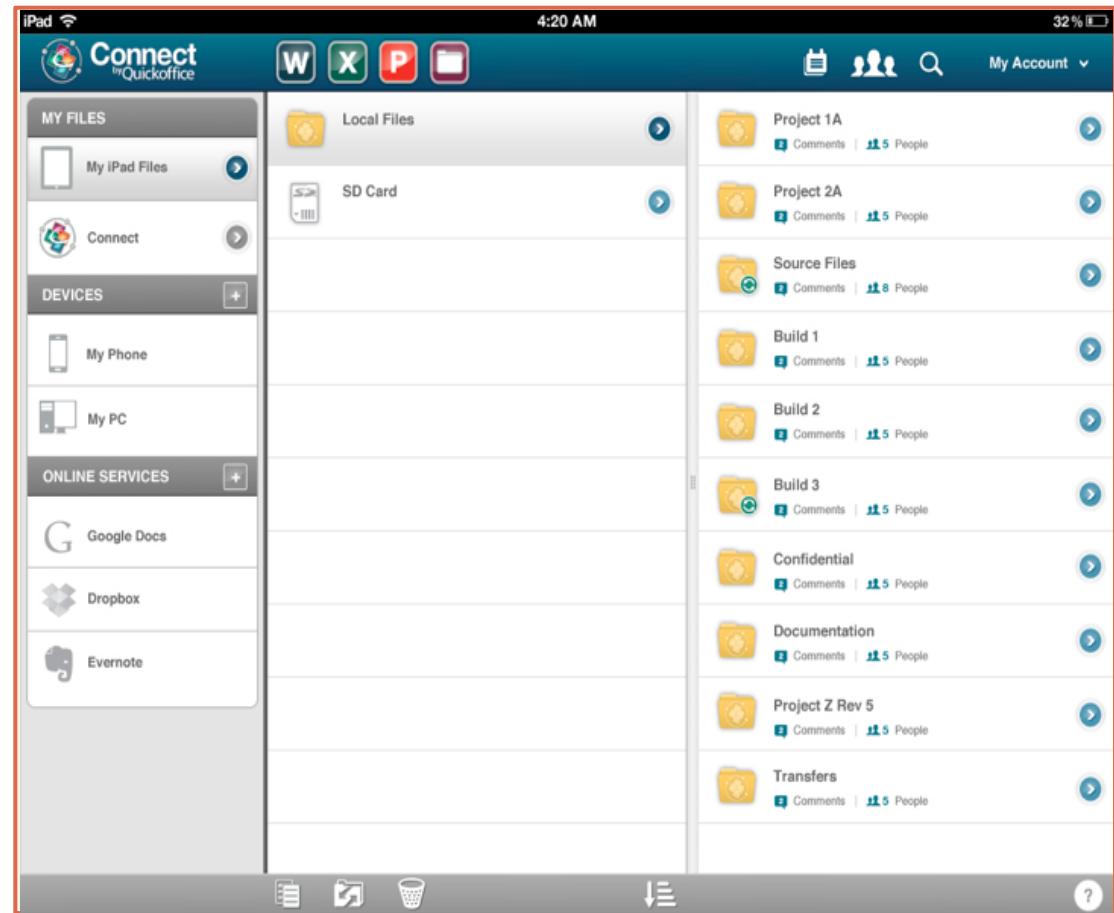
Cons

- Highest Development Cost
- Dedicated teams for different Platforms
- Architecture Reuse Possible but
- Design/Code Reuse not Possible
- AppStore/Market approval is prerequisite for launch of new features
- Fragmentation is also an issue (Android)

HYBRID APPS OVERVIEW

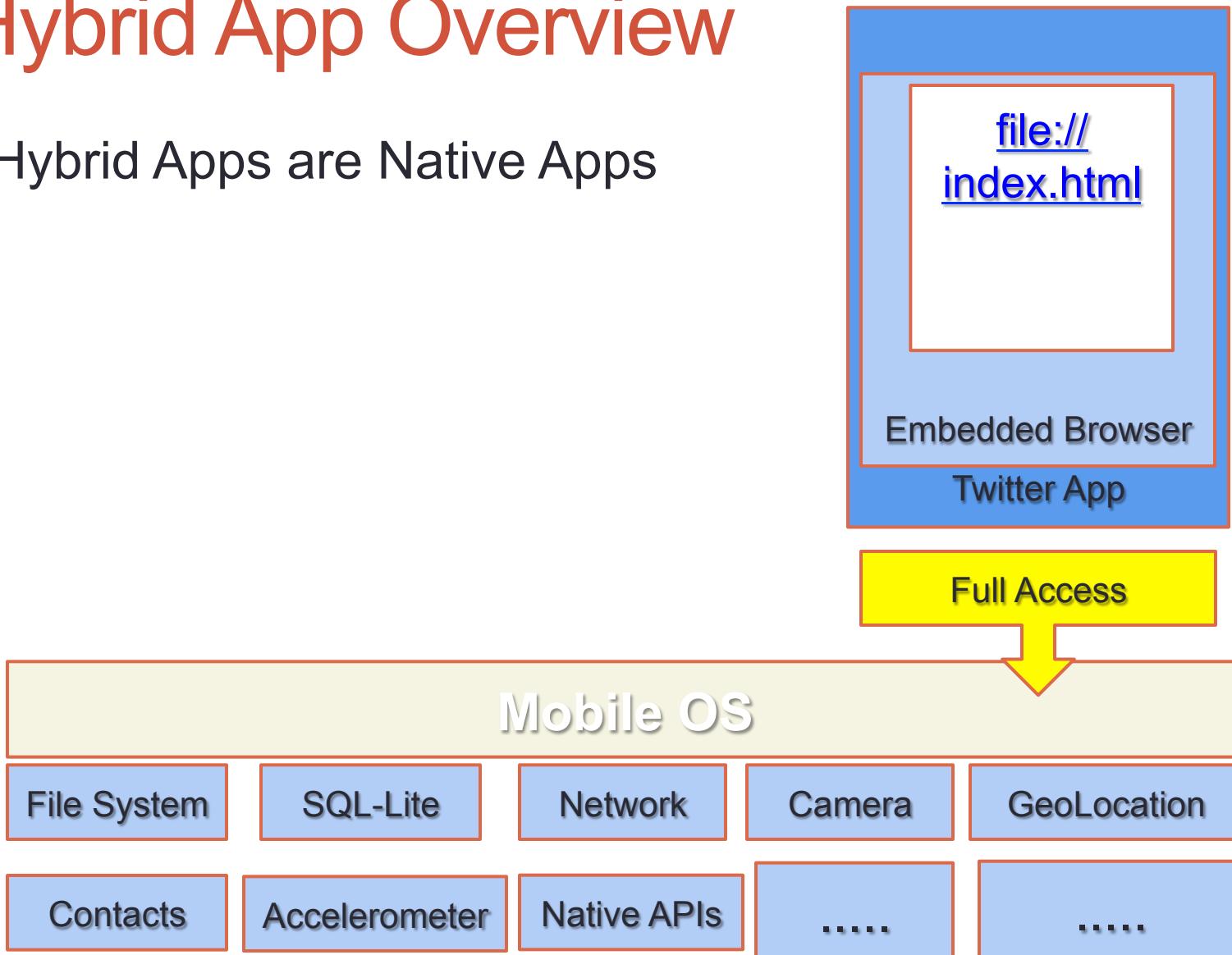
HTML5 + Native

Hybrid Mobile App



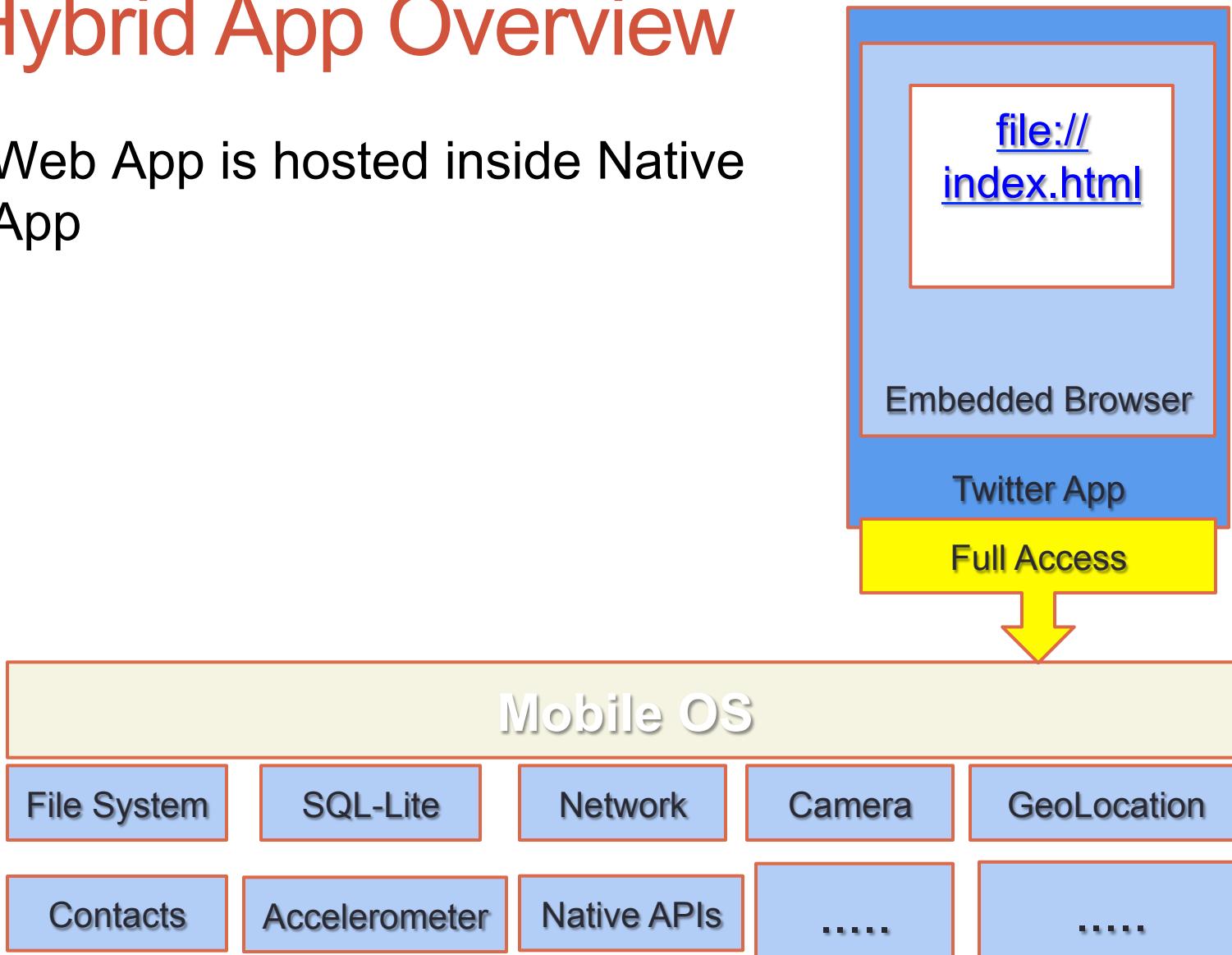
Hybrid App Overview

- Hybrid Apps are Native Apps



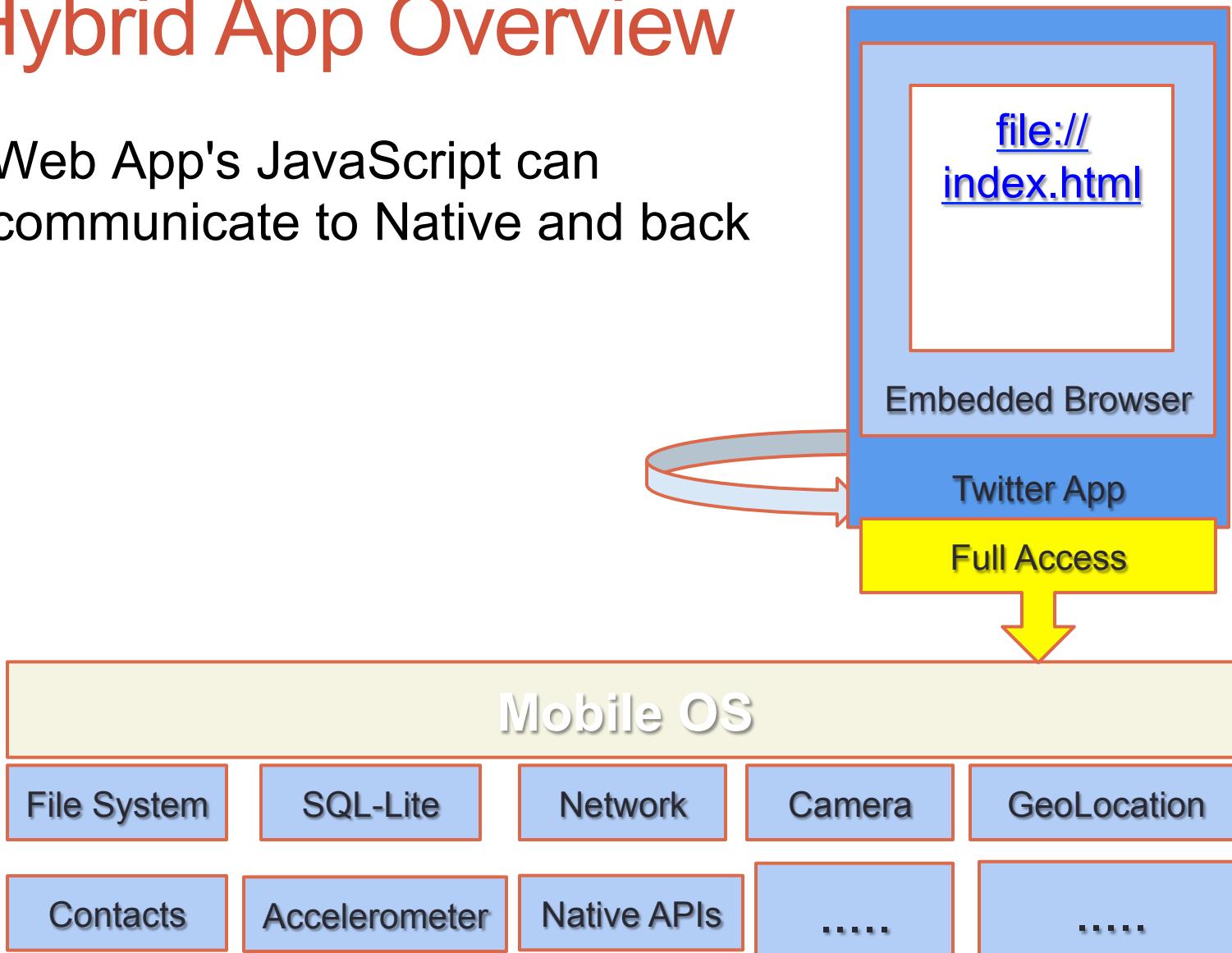
Hybrid App Overview

- Web App is hosted inside Native App



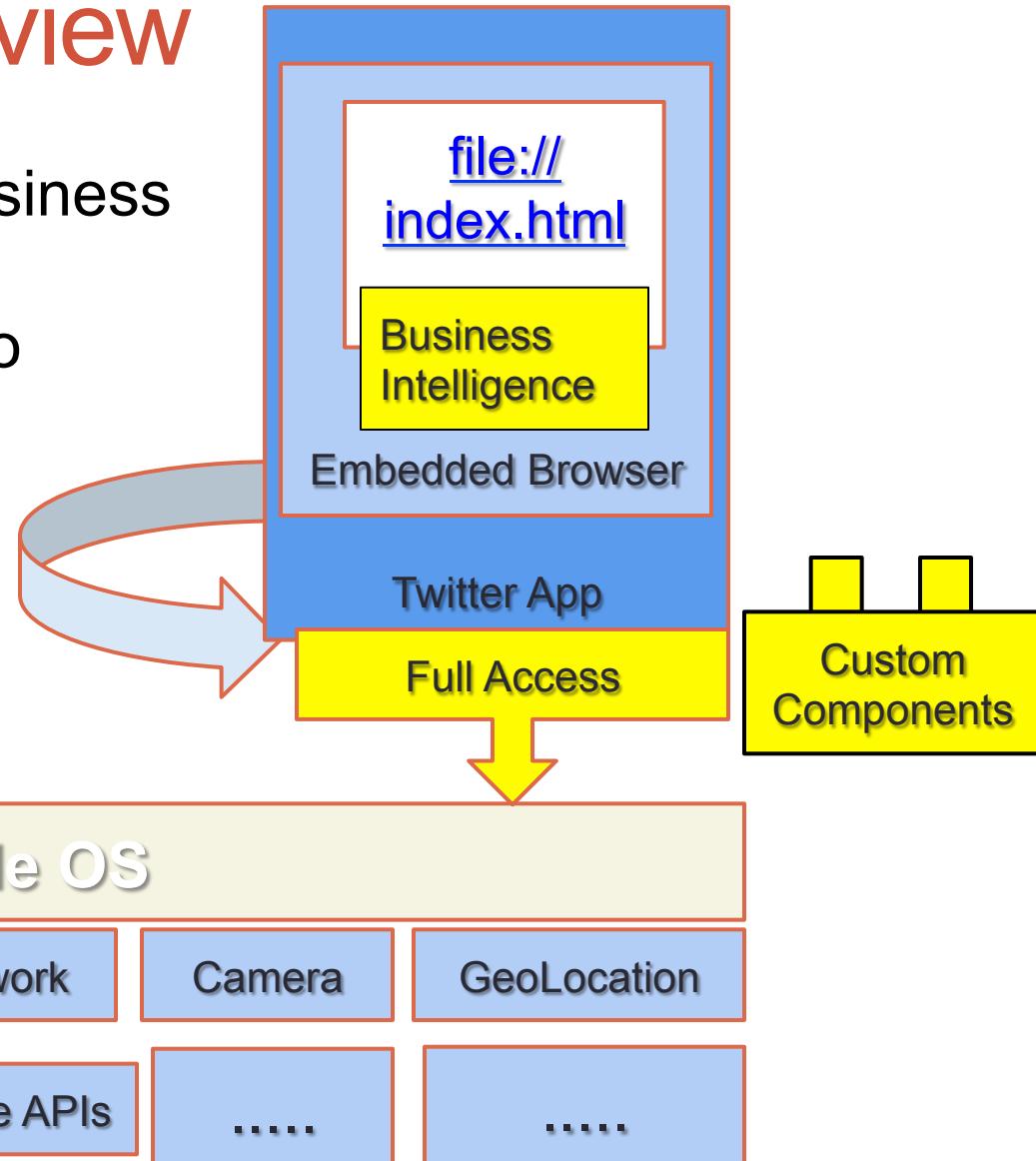
Hybrid App Overview

- Web App's JavaScript can communicate to Native and back



Hybrid App Overview

- HTML5 contains a BI (business intelligence), a Native Component built like Lego blocks



HYBRID PROS

The good

Pros

- Best of Both Worlds
- Native App with Embedded Browser
- HTML5 in Embedded Browser
- Business Logic in HTML 5/Server
- Sensor Array available via Native
- Any Extensions are Native

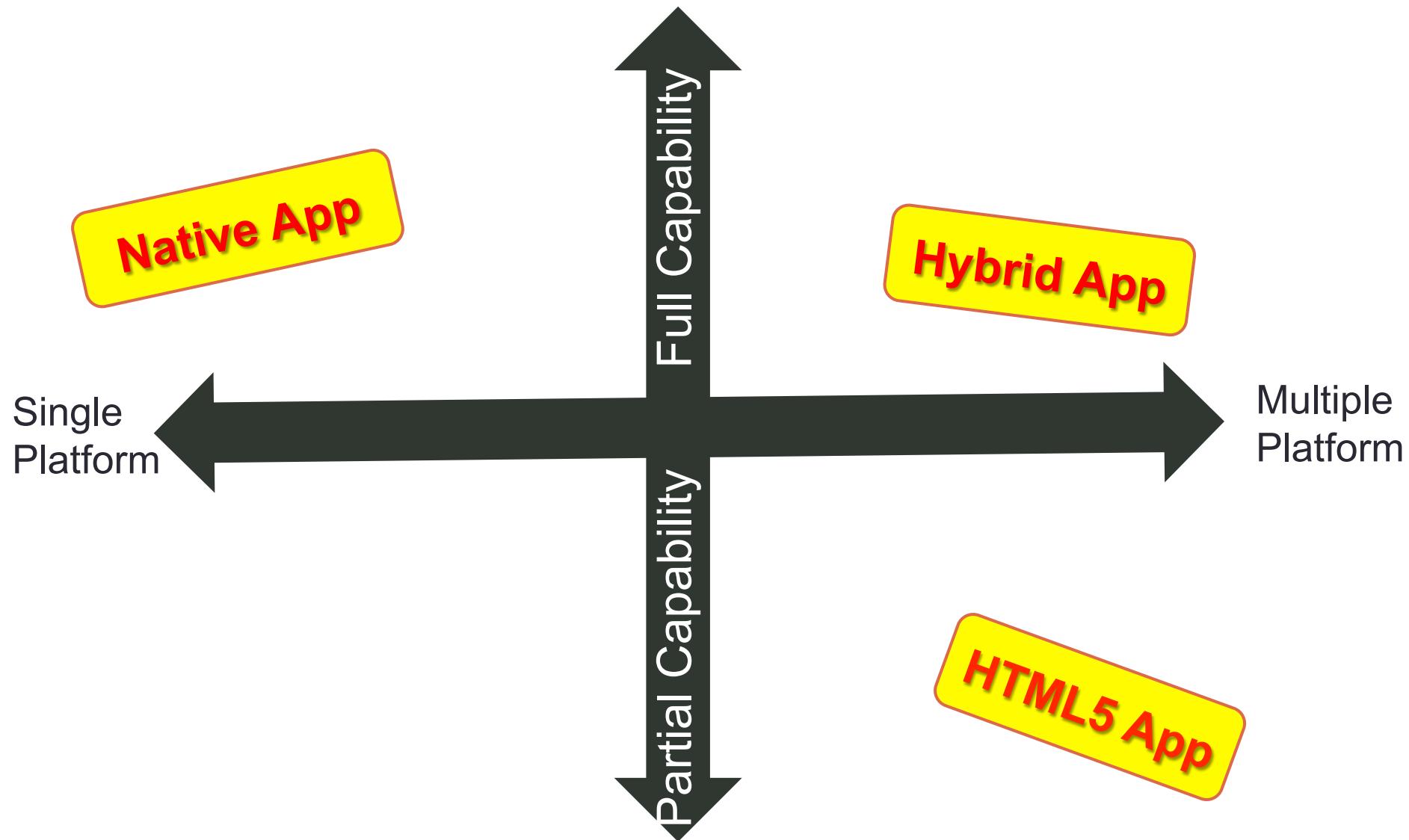
HYBRID CONS

The not so good

Cons

- Development Environment is Complex
 - Eclipse, XCode, Visual Studio
 - CIT Builds and Release cycles
- Limited Native Skills are required
- Native Skills required for extensions across platforms
- Pains from both worlds— Catching up on new OS and HTML5 Feature sets

Capability - Platform Graph



HYBRID APP CASE STUDY

QuickOffice Connect

- File Sync Service for Mobile/Desktop
- Built as Hybrid Mobile App
- User Interface in HTML5
- Sync Code is Native
- Built using inhouse PhoneGap-like platform

QuickOffice Connect - 1

The screenshot shows the QuickOffice Connect application running on an iPad. The top status bar indicates the device is an iPad with signal strength, the time is 4:20 AM, and the battery level is at 32%.

The main interface features a dark blue header with the "Connect by Quickoffice" logo, document icons (Word, Excel, PowerPoint, and File), and navigation links for "My Account".

The left sidebar contains sections for "MY FILES" (My iPad Files, Connect), "DEVICES" (My Phone, My PC), and "ONLINE SERVICES" (Google Docs, Dropbox, Evernote).

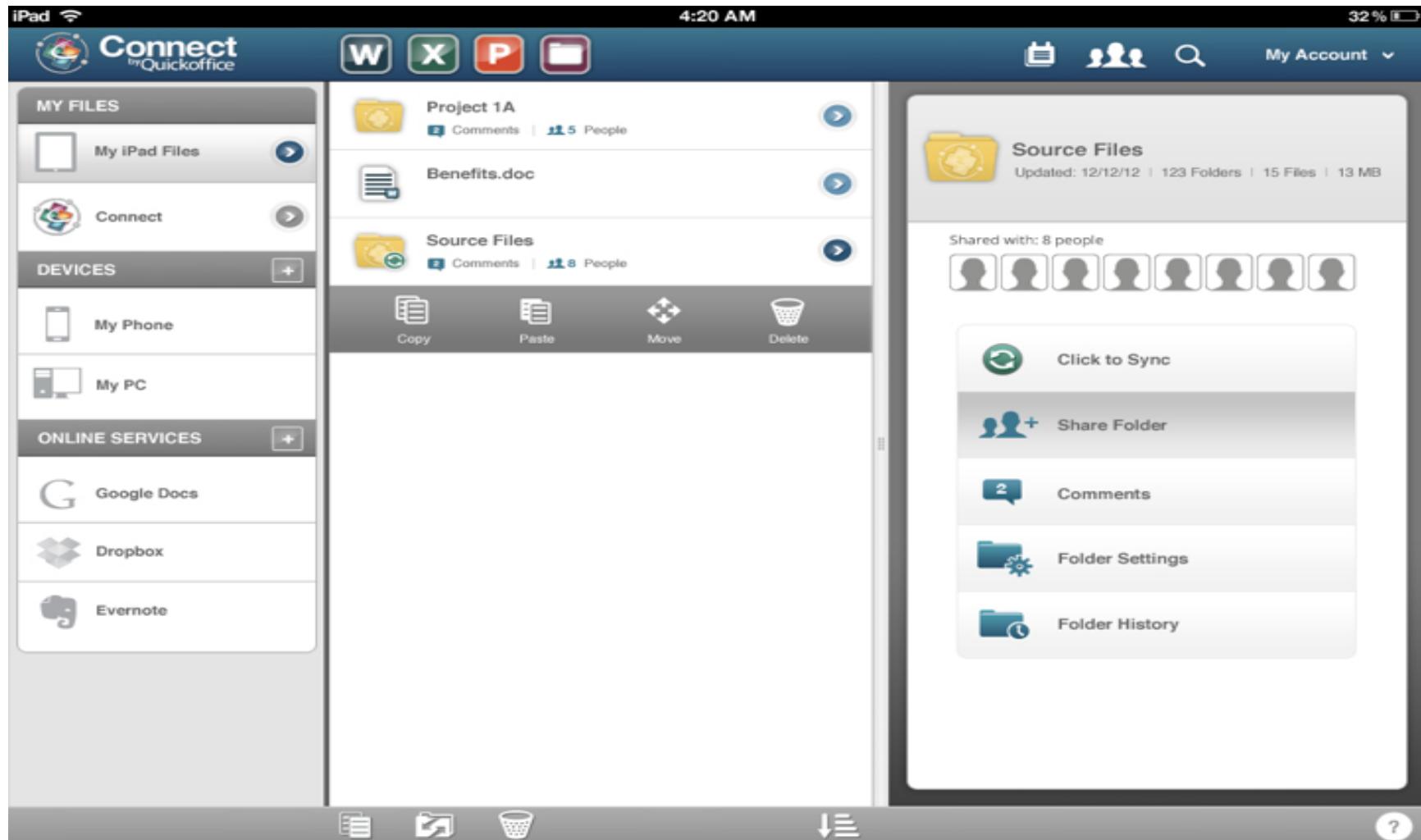
The central area displays "Local Files" from "SD Card", showing a blank list.

The right side lists various projects and documents, each with a preview icon, comments count, people count, and a "View" button:

- Project 1A: 2 Comments | 11.5 People
- Project 2A: 2 Comments | 11.5 People
- Source Files: 2 Comments | 11.8 People
- Build 1: 2 Comments | 11.5 People
- Build 2: 2 Comments | 11.5 People
- Build 3: 2 Comments | 11.5 People
- Confidential: 2 Comments | 11.5 People
- Documentation: 2 Comments | 11.5 People
- Project Z Rev 5: 2 Comments | 11.5 People
- Transfers: 2 Comments | 11.5 People

The bottom navigation bar includes icons for file operations (New, Open, Delete) and a help/question mark icon.

QuickOffice Connect - 2



QuickOffice Connect - 3

The screenshot shows the QuickOffice Connect app interface on an iPad. The top navigation bar includes icons for Word (W), Excel (X), PowerPoint (P), and a folder (F). The status bar indicates it's 4:20 AM and the battery level is at 32%.

MY FILES

- My iPad Files
- Connect

DEVICES

- My Phone
- My PC

ONLINE SERVICES

- Google Docs
- Dropbox
- Evernote

Folder Activity

- Comment added to My Folder
First Name Last Name 2:00 pm from Device
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Praesent non ante in mi venenatis viverra.
- My Folder was added to Folder Name
First Name Last Name 2:00 pm from Device
- My File #2 has been deleted
First Name Last Name 2:00 pm from Device
- First Name Last Name has accepted an invitation to My Folder and can now view the files
First Name Last Name 2:00 pm from Device
- First Name Last Name can no longer view files and folders in My Folder
First Name Last Name 2:00 pm from Device

QuickOffice Connect - 4

The screenshot shows the QuickOffice Connect application running on an iPad. The top status bar indicates it's 4:20 AM with 32% battery. The main interface has a dark blue header with icons for Word (W), Excel (X), PowerPoint (P), and a folder. Below the header is a navigation bar with 'Connect by Quickoffice' logo, a search icon, and 'My Account'. On the left, there's a sidebar with sections for 'MY FILES', 'DEVICES', and 'ONLINE SERVICES'. Under 'MY FILES', there are links to 'My iPad Files' and 'Connect'. Under 'DEVICES', there are links to 'My Phone' and 'My PC'. Under 'ONLINE SERVICES', there are links to 'Google Docs', 'Dropbox', and 'Evernote'. The main content area displays a list of files and folders: 'Project 1A', 'Project 2A', 'Benefits.doc', 'Build 1', 'Build 2', 'Build 3', 'Confidential', 'Documentation', 'Project Z Rev 5', and 'Transfers'. Each item has a small icon, a name, a 'Comments' section, and a 'People' section. To the right of the file list is a large preview window for 'Benefits.doc', showing its contents. Below the preview are several action buttons: 'Share File', 'Comments', 'File Settings', 'File Activity', and 'File Versions'.

QuickOffice Connect - 5

The screenshot shows the QuickOffice Connect application running on an iPad. The top status bar indicates it's 4:20 AM with 32% battery. The main interface has a dark blue header with icons for Word (W), Excel (X), PowerPoint (P), and Files (a folder icon). On the left, there's a sidebar with sections for MY FILES, DEVICES, and ONLINE SERVICES. Under MY FILES, there are entries for "My iPad Files" and "Connect". Under DEVICES, there are entries for "My Phone" and "My PC". Under ONLINE SERVICES, there are entries for Google Docs, Dropbox, and Evernote. The central content area is titled "Manage People (3)" and shows a list of three people: "First Name Last Name" with the email "email@address.com". To the right of each person entry is a yellow folder icon with the number "4", indicating pending invitations. Below this, there's a table for managing folders:

Folder Name	Permissions	Action
My Favorite Folder	Editor >	Save
My Other Favorite Folder	Editor >	Save
My Mom's Favorite Folder	Editor >	Save
My Least Favorite Folder	Editor >	Save

Below this table is a section for "Pending Invitations" with one entry: "Just Some Folder". It shows the same editor permission and a "Resend" button next to the "Save" button.

QuickOffice Connect - 6

The screenshot shows the QuickOffice Connect application running on an iPad. The top status bar indicates the device is an iPad with a signal, the time is 4:20 AM, and the battery level is 32%. The main interface has a dark blue header with icons for Word (W), Excel (X), PowerPoint (P), and File (F). On the right side of the header are icons for a calendar, two people, a magnifying glass, and "My Account". Below the header is a navigation bar with tabs: Show, All, iPad, Connect, My Phone, My Computer, Google Docs, Dropbox, and Evernote. A "Search" button is located on the far right of the navigation bar.

The left sidebar contains sections for "MY FILES", "DEVICES", and "ONLINE SERVICES". Under "MY FILES", there is a folder icon labeled "My iPad Files". Under "DEVICES", there are icons for "Connect", "My Phone", and "My PC". Under "ONLINE SERVICES", there are icons for "Google Docs", "Dropbox", and "Evernote".

The central content area is divided into several sections:

- IPAD FILES:** Contains items: "Project 1A", "Benefits.doc", and "Source Files".
- CONNECT FILES:** Contains items: "Benefits.doc", "Build 2", and "Build 3".
- GOOGLE DOC FILES:** Contains item: "Task List.doc".

At the bottom of the screen are icons for a new document, a photo, a trash can, and a download arrow. A question mark icon is in the bottom right corner.

Search Feature: On the right side of the screen, there is a large graphic of a magnifying glass over a document icon. Below it is the text: "Need to search for files on your connected devices?". A green button at the bottom right says "Upgrade Now".

When to choose which route?

- Rich User Experience
- Performance
- Development Cost
- Time to Market
- App Store Distribution
- Security

Factors for Choosing

	Native	Hybrid	HTML5
Performance	Highest	High	Low
Rich UI	Highest	Moderate	Moderate
Development Cost	Highest	High	Lower
Time to Market	Longest	Moderate	Shortest
App Store Engagement	Maximum Engagement	Maximum Engagement	No Engagement
Security	Highest	High	Limited

What tools are available?

- Native App Wrappers
 - PhoneGap
 - Trigger IO (*new)
- UI Framework
 - Backbone
 - Sencha Touch 2

Backbone JS



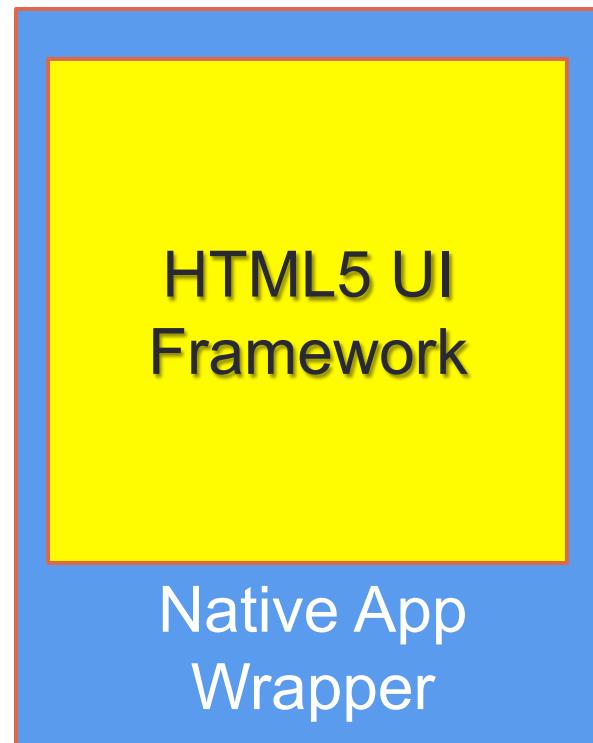
Flexible

Sencha Touch 2



Complete

Hybrid Application Structure



PhoneGap

- Link - <http://phonegap.com/>
- Most Mature Native Wrapper Framework
- Supports 7 Platforms
- Supports building Extension
- Backed by Adobe
- OpenSource



Trigger.IO

- Link - <https://trigger.io/>
- Much like PhoneGap
- Claims to be faster than PhoneGap
- Claims to better in Build process
- OpenSource

The screenshot shows the Trigger.IO website homepage. At the top, there's a dark header bar with the Trigger.IO logo (a stylized 'T' icon) and the word "TRIGGER.IO" next to it, with a "v2.0" badge. To the right of the logo are links for "EXAMPLES", "HOW IT WORKS", "PRICING", "MODULES", and "DOCS". On the far right, there's a "Log In" button. Below the header, the main content area has a white background. It features a large heading "The simplest way to build amazing mobile apps" with a bulleted list of benefits below it. To the right of this text is a laptop displaying a terminal window with the following commands:
`> forge create
> forge build ios
> forge run ios
> forge package ios`

**The simplest way to build
amazing mobile apps**

- ✓ Build native apps for iOS and Android using JavaScript
- ✓ Native UI, push, analytics, login modules "out-of-the box"
- ✓ Cloud build service, no need to setup Eclipse / Xcode
- ✓ Update your app without re-submitting to the App Store
- ✓ Open platform, extend with hooks, write native modules

[Create Account](#)

"

I updated my client's Trigger.io app to v2.0. We're on a hyper-compressed dev timescale, so I was REALLY hoping the upgrade was painless. What. Can. I. Say. Absolutely fantastic, really seeing the difference in v2.0. You folks totally rock.

Alan Graham, [The Simpler Solution Ltd](#) — **"**

Backbone JS

- Link - <http://backbonejs.org/>
- Most Flexible JavaScript UI Framework
- Works for both Desktop/Mobile UI
- Works with many other Javascript frameworks
- OpenSource

The screenshot shows the official Backbone.js website. At the top, there's a navigation bar with links for "Backbone.js (1.2.0)", "GitHub Repository", and "Annotated Source". Below the navigation, the "Getting Started" section includes a brief introduction and links to "Models and Views", "Collections", "API Integration", "Rendering", and "Routing". The "Events" section lists methods like "on", "off", "trigger", "once", "listenTo", "listenToOnce", and "Catalog of Built-in Events". The "Model" section lists methods such as "extend", "constructor / initialize", "get", "set", "escape", "has", "unset", "clear", "id", "idAttribute", "cid", "attributes", "changed", "defaults", "toJSON", "sync", and "parse". To the right, the main content area features the Backbone.js logo and the text: "BACKBONE.JS". It explains that Backbone.js provides structure to web applications by binding models to views and collections. It also mentions the availability of source code on GitHub, test suites, examples, and tutorials. Below this, there's a note about reporting bugs and a link to the GitHub issues page. Further down, it states that Backbone is an open-source component of DocumentCloud. The bottom section is titled "Downloads & Dependencies" and offers three download options: "Development Version (1.2.0)" (69kb, full source, tons of comments), "Production Version (1.2.0)" (7.3kb, packed and gzipped, source map), and "Edge Version (master)" (unreleased, use at your own risk). There are also "Source" and "Issues" links.

Sencha Touch 2

- Link - <http://www.sencha.com/products/touch>
- Richest Mobile UI framework
- Complete Framework
- Free for Commercial Use
- Paid Support available

The screenshot shows the Sencha Touch product page. At the top, there's a navigation bar with links for SUPPORT, FORUM, RESOURCES, BLOG, and CONTACT US. On the right side of the nav bar are buttons for TRY FOR FREE (green) and BUY NOW (orange). Below the nav bar, the Sencha logo is on the left, and a menu bar has links for Products, Services, Training, Customers, Company, and Store. A search bar is also present. The main content area features a large image of three mobile devices (two phones and one tablet) displaying various Sencha Touch app interfaces. Below this image, there are two tabs: OVERVIEW (which is active) and RESOURCES. A section titled "Create native-looking HTML5 apps using JavaScript" is described with the text: "Sencha Touch is the leading MVC-based JavaScript framework for building cross-platform mobile web applications. Sencha Touch leverages hardware acceleration techniques to provide high-performance UI components for mobile devices." To the right of this text are three buttons: DOWNLOAD FOR FREE (green), BUY SUPPORT (orange), and CONTACT SALES (grey). At the bottom, there are sections for GETTING STARTED (with links to Quick Start Guide and Sign up for Sencha Training), CUSTOMER QUOTES (with a small icon), and a footer with links for SUPPORT, DOWNLOAD, and PURCHASE.

Factors Affecting Choice

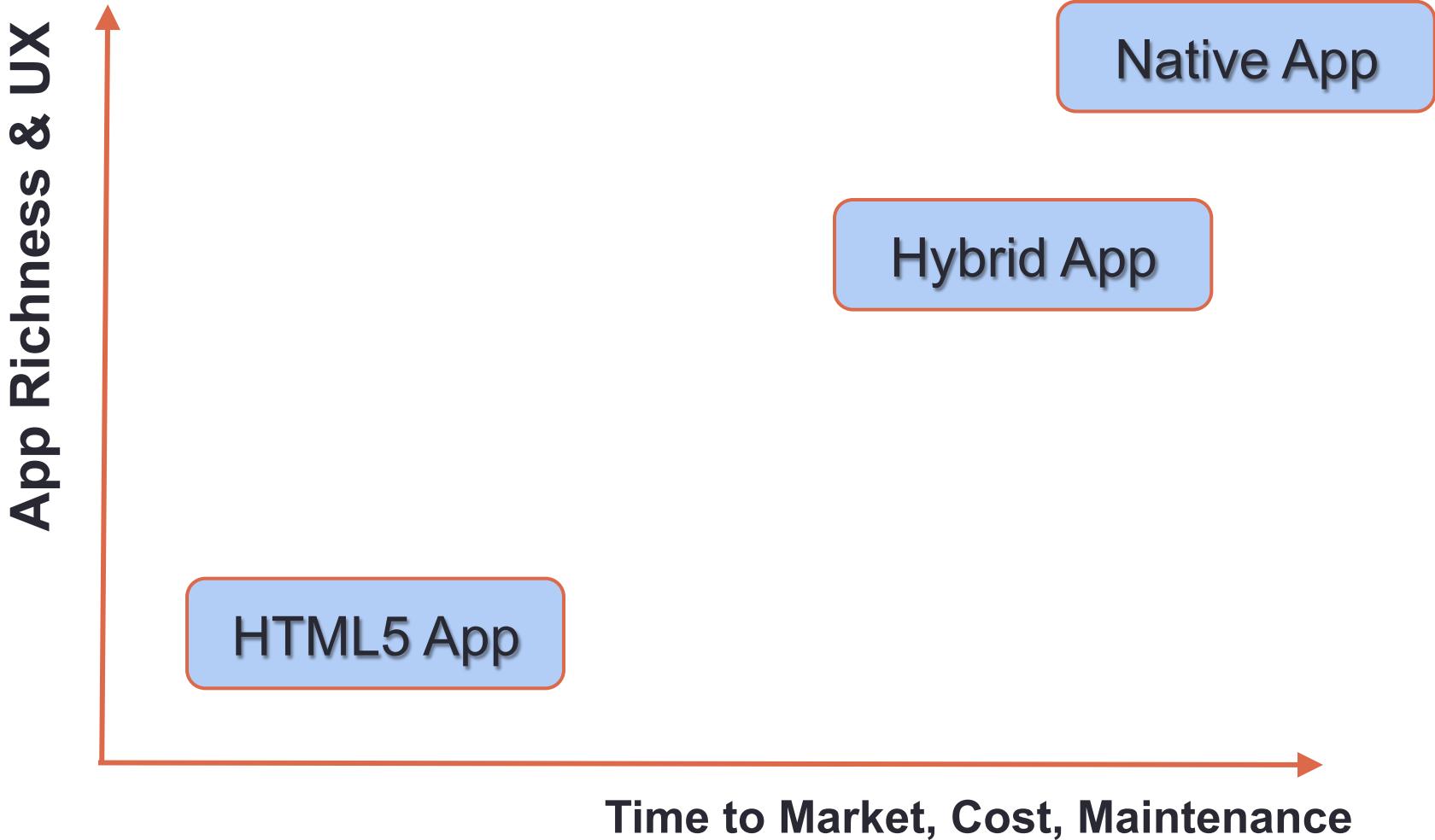
Product
Features

Time/Cost to
Market

Kind of
Audience

Available
Team & IP

Pros Vs Cons



Web Apps

website optimized
for mobile devices



fast development

html5, css3 & javascript

geolocation (limited)

“progressive” design

local storage (limited)



limited UI effects

no device hardware

no access to app stores

not as fast as native

Native Apps

developed with specific device SDK
(software development kit)



- local storage
- geolocation
- device hardware
- beautiful UI effects
- access to app stores
- fast



- slow development
- limited to single device
- expensive

Hybrid Apps

developed with web tools,
wrapped as native app



- fast development
- html5, css3 & javascript
- geolocation (limited)
- device hardware
- local storage (limited)
- access to app stores



- limited UI effects
(getting better)
- not as fast as native

Final Comparison

Native	HTML5	Hybrid
<ul style="list-style-type: none">• Needs Richest UI• Focuses on Single Platform (Mobile is the main platform)• Can be used to build Authoring tools, Games, Social Networking Apps etc.• Very Concerned with UX (Apple-like Quality)	<ul style="list-style-type: none">• Needs rich Mobile users with minimal cost and effort• App Store Marketing and Monetization are not important• Required as a fallback for social e.g, Twitter still has a mobile web site	<ul style="list-style-type: none">• Needs Rich UI• Focuses on Multiple Platforms• Can be used to build Enterprise Apps, Travel/News Apps, Sync Clients, etc.• Most of the time will suffice your needs

Questions?

