

# The Random Walk of Facebook iOS App

Facebook iOS 技术发展十年

覃超 @ FreeS VC



促进软件开发领域知识与创新的传播



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[上海站] 2016年10月20-22日  
咨询热线: 010-64738142

# Self Introduction

**2010: Facebook software engineer**

**Mobile Engineer:**

**Facebook Phone (1) -> iOS app (2) ->  
Messenger**

**iOS:**

**Voice message, sticker, connection status,  
Message sending perf & reliability**

1 Status quo of Facebook iPhone App

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2 1.0: Native + 九宫格

---

3 2.0: Faceweb (HTML5) + HamburgerMenu

---

4 3.0: Native + Immutable Data = Hybrid

---

5 Takeaways for us

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Why Facebook App?











# TOP SMARTPHONE APPS OF 2015

RANK	APP	AVG UNIQUE USERS	YOY % CHANGE
1	FACEBOOK	126,702,000	8
2	YOUTUBE	97,627,000	5
3	FACEBOOK MESSENGER	96,444,000	31
4	GOOGLE SEARCH	95,041,000	3
5	GOOGLE PLAY	89,708,000	7
6	GOOGLE MAPS	87,782,000	8
7	GMAIL - EMAIL FROM GOOGLE	75,105,000	4
8	INSTAGRAM	55,413,000	23
9	APPLE MUSIC	54,550,000	26
10	MAPS (APPLE)	46,406,000	16










Note: The list is ranked on average unique audience, which is the average of January 2015-October 2015.

6+ of Top 10 most used apps globally = Messaging Apps

### Top Apps by Usage

Rank	App
①	 Facebook
②	 WhatsApp
③	 Messenger
④	 Instagram
⑤	 LINE
⑥	 Viber
⑦	 KakaoTalk
⑧	 Clash of Clans
⑨	 WeChat
⑩	 Twitter

### Top Apps By Number of Sessions

Rank	App	Sessions
①	 KakaoTalk	55
②	 WhatsApp	37
③	 WeChat	29
④	 VK	29
⑤	 LINE	26
⑥	 Viber	20
⑦	 Facebook	20
⑧	 Clash of Clans	16
⑨	 Instagram	12
⑩	 Messenger	8

Messaging Apps

# Status Quo of Facebook iOS Engineering



00:29 中国联通

Top Charts



Facebook 4+  
Facebook, Inc. >  
Essentials

★ ★ ★ ★ ☆ (1,728)

UPDATE

Details Reviews Related

Carrier 1:20 PM 100%

Search

What's on your mind?

Guillermo Moreno with Josephine Williams and 7 others.  
Yesterday at 10:14 PM · 🌐

Good friends, good food and a lot of laughs.




Myles Larson and 23 others 4 Comments

Justine Lee

News Feed Requests Messenger Notifications More

Carrier 1:20 PM

Josephine Williams



Josephine Williams

Friends Following Message

Be nice, the world is a small town

Accountant  
Lives in San Francisco, California  
Studied at University of Pennsylvania  
From Chicago, Illinois

News Feed Requests Messenger Notifications

00:29 中国联通

Top Charts

Details Reviews Related

### Information

Seller	Facebook, Inc.
Category	Social Networking
Updated	Jan 9, 2016
Version	57.0
Size	123 MB
Rating	Rated 4+

Family Sharing Yes

Compatibility Requires iOS 7.0 or later. Compatible with iPhone, iPad, and iPod touch.

Languages English, Czech, Danish, Dutch, Finnish, French, German, Greek, Indonesian, Italian, Japanese, Korean, Malay, Norwegian Bokmål, Polish, Portuguese, Russian, Simplified Chinese, Spanish, Swedish, Thai, Traditional Chinese, Turkish, Vietnamese

Version History >

Developer Website >

License Agreement >

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# iOS Engineering @ Facebook

1. 1000+ iOS mobile engineers
2. 100+ shared libs
  - using Buck to generate.
3. Module based development
4. Data model: immutable (thread safe)

# Codebase overview

- 1. Single iOS code repository**
  - One gigantic codebase**
- 2. Shared libraries: fine granularity**
  - 100+ shared libs**
- 3. No cocoapods - inhouse module and dependency management tool (Buck)**

# Codebases

Millions of lines of code

hundred  
thousand

simple iPhone game app



Unix v 1.0  
1971



Win32/Simile virus



average iPhone app



Pacemaker



Photoshop v. 1.0  
1990



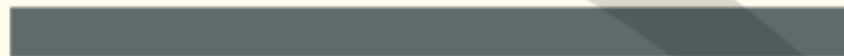
Camino  
web browser



Quake 3 engine  
3D Video game system



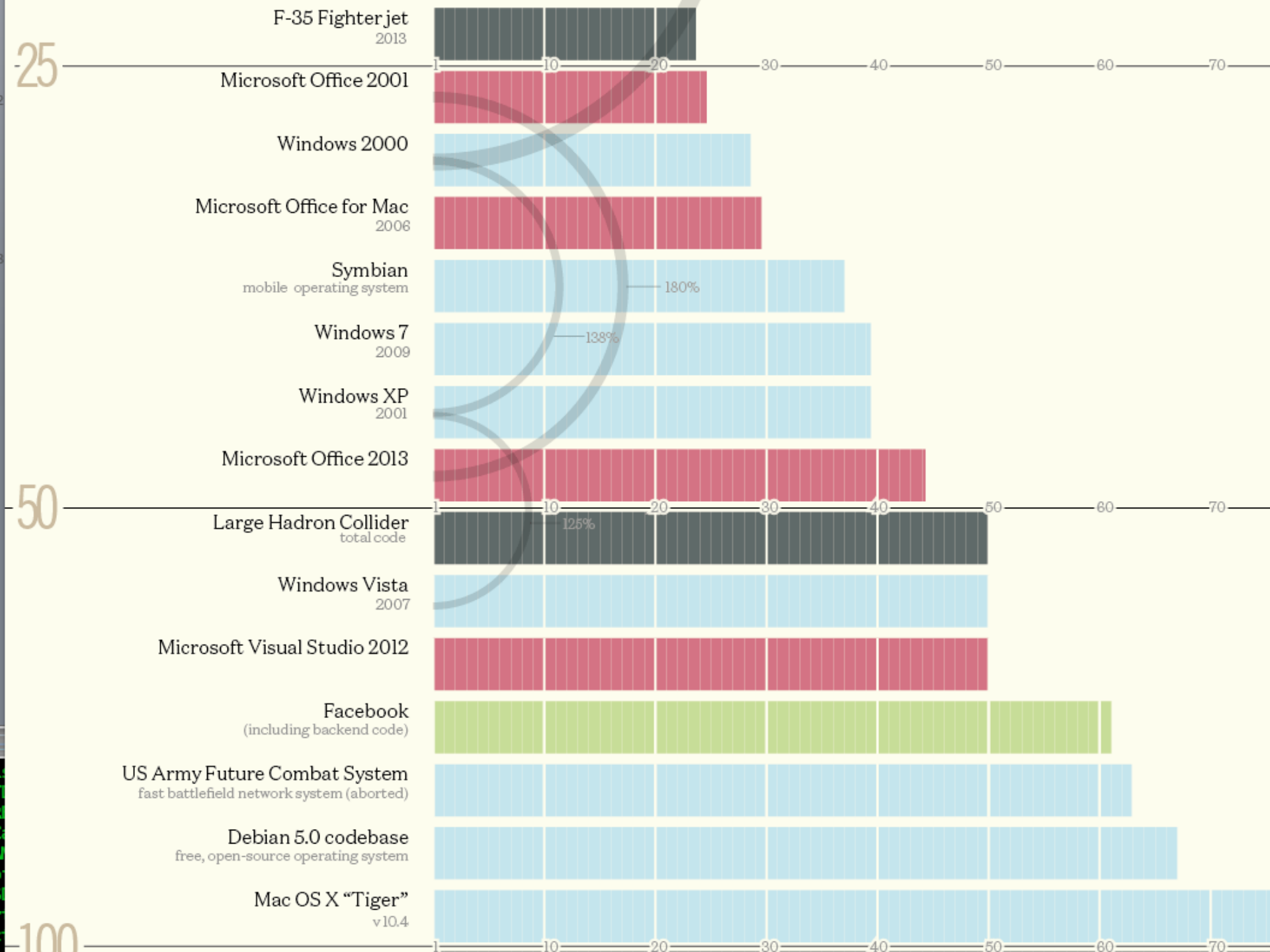
Space Shuttle



a million lines of code



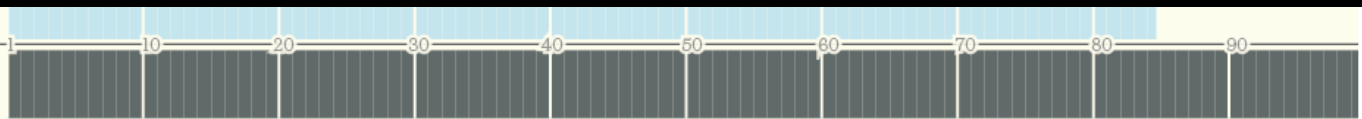
0 1 2 3 4 5



100

v10.4

**Car software**  
average modern high-end car

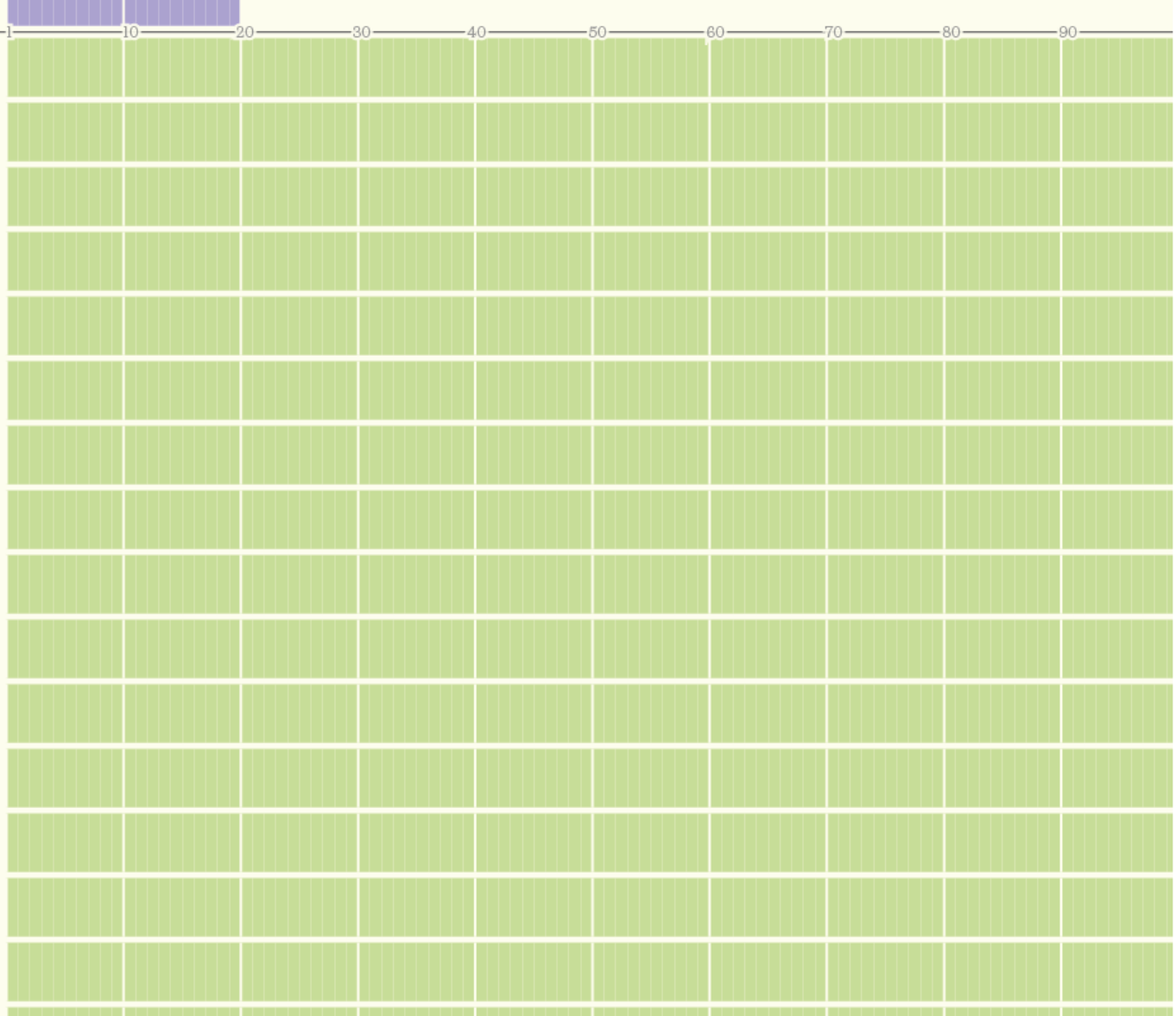


**Mouse\***  
Total DNA basepairs in genome



2 billion

**Google**  
all internet services



# What you can learn?

- 1. Native → HTML5 → Native**
- 2. How to scale your mobile team?**
- 3. Module based programming  
React Native**

# A brief review of the history of Facebook iOS app



# Facebook 1.0

2008 - 2010



# Facebook 1.0



# Facebook 1.0

1. Made by solo developer: Joe Hewitt



2. Netscape → Firebug & DOM Inspector  
→ AOL

3. iPhone app → Three20

# <http://joeheewitt.com/>

September 22nd, 2011	Web Technologies Need an Owner
June 20th, 2011	Inertial Scrolling
May 6th, 2011	Creative Tools
March 15th, 2011	The Thank You Economy
October 20th, 2010	Android and Open Source
January 28th, 2010	iPad
November 13th, 2009	On Middle Men
August 24th, 2009	Innocent Until Proven Guilty
June 20th, 2009	The "S" Should Stand for Smooth
March 23rd, 2009	The Three20 Project
October 10th, 2008	Developing Facebook for iPhone
June 16th, 2008	Firebug News
April 1st, 2008	Blog 3.0
September 5th, 2007	Keynote
August 21st, 2007	The iPhone Is IE4 Again (in a good way)
July 19th, 2007	Facebook Day One
July 17th, 2007	iUI Monotony
July 15th, 2007	Origins of Blogging
July 11th, 2007	Introducing iUI
July 9th, 2007	iPhoneDevCamp
July 2nd, 2007	iPhone Tips: Look Ma, no toolbar!
July 1st, 2007	Firebug for iPhone
June 29th, 2007	iPhone JavaScript Experiments: Day One
June 28th, 2007	Things that Don't Suck

# Three20 Project

README.mdown

## Three20

Three20 is a collection of iPhone UI classes, like a photo viewer, and general utilities, like an HTTP disk cache. Three20 is derived from the [Facebook iPhone app](#), which is one of the most downloaded iPhone apps ever.



## Community

If you would like to ask any questions regarding Three20, please check out any of the following:

- [Three20.info](#)
- [Three20 Mailing List](#)
- [Three20 Scope](#)

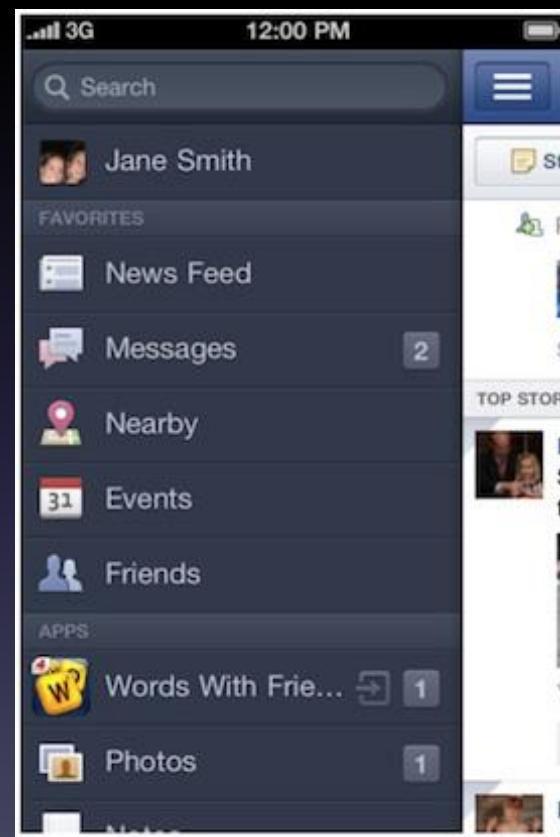
# Facebook 1.0 启示

- 拓荒时代的 Apple SDK
- Three20 projects
  - Nimbus, AFNetworking, SDWebImage
- Pure Native Era



# Facebook 2.0

2010 – 2012: Faceweb Era (HTML5)



# Facebook 2.0

- **HTML5 webpages rule all → Faceweb**
  - **Bret Taylor, Dave Fetterman → Zuck**
    - **HTML5 – mobile tech stack**
    - **Easier UI layout**
    - **Cross platform: write once, run everywhere**
    - **Hot push, no app store review needed**
- etc...**



# Facebook 2.0



# Facebook 2.0

- **HTML5 webpages rule all → Faceweb**
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“The biggest mistake we made as a company was betting too much on web (HTML5) as opposed to native.”

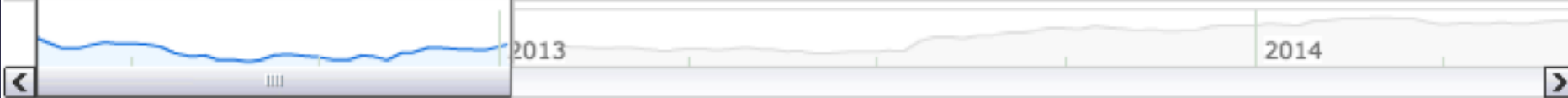
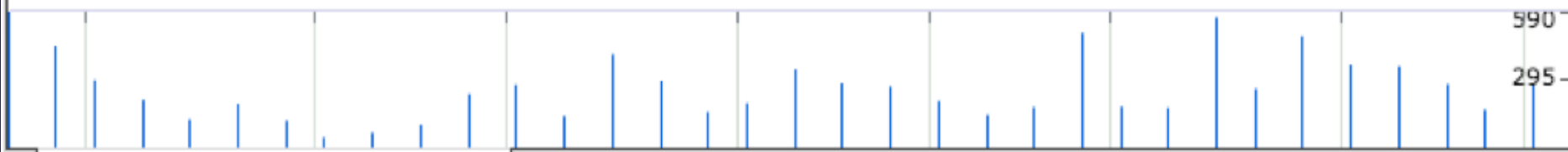
- Mark Zuckerberg  
CEO, Facebook

Zoom: [1d](#) [5d](#) [1m](#) [3m](#) [6m](#) [YTD](#) [1y](#) [5y](#) [10y](#) [All](#)

May 25, 2012 - Jan 04, 2013 -9.47 (-24.77%)



Volume (mil / 1wk)



[Settings](#) | [Technicals](#) | [Link to this view](#)

Volume delayed by 15 mins.

# Facebook 2.0 启示

## Engineering Clichés (陷阱)

**“Cross platform: write once, runs anywhere”**

- Platform Tax (JS bridge)
- Versioning (Hacks everywhere)
- Comprises for every platform
- Browser Fragmentation

# Facebook 2.0 启示

## 2. Performance Issue

- No Nitro JS engine in UIWebView
- Single Thread in Javascript
- Touch & Scroll delay in WebView

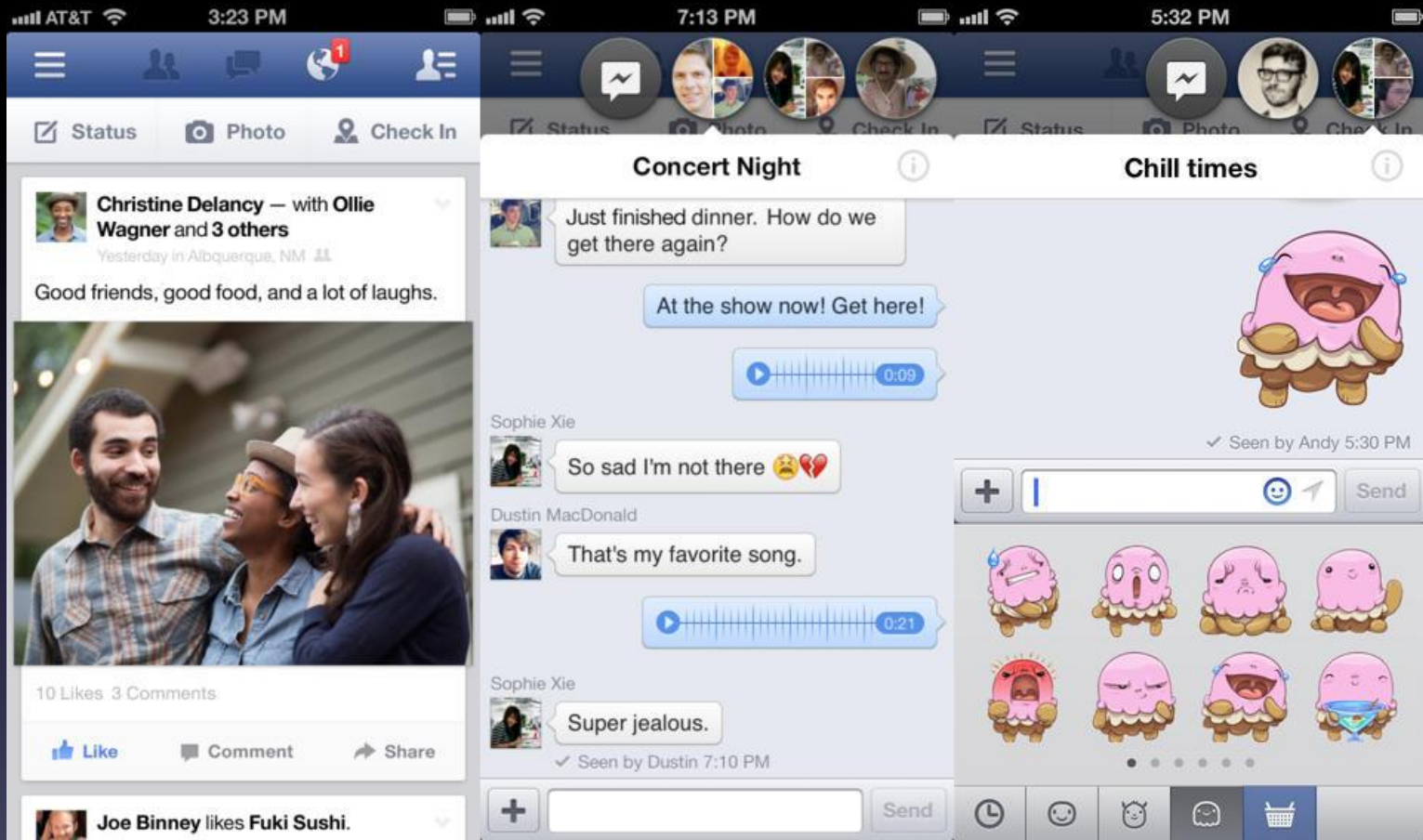
## 3. More Data Consumption

## 4. More Battery Consumption

# Facebook 2.0 启示

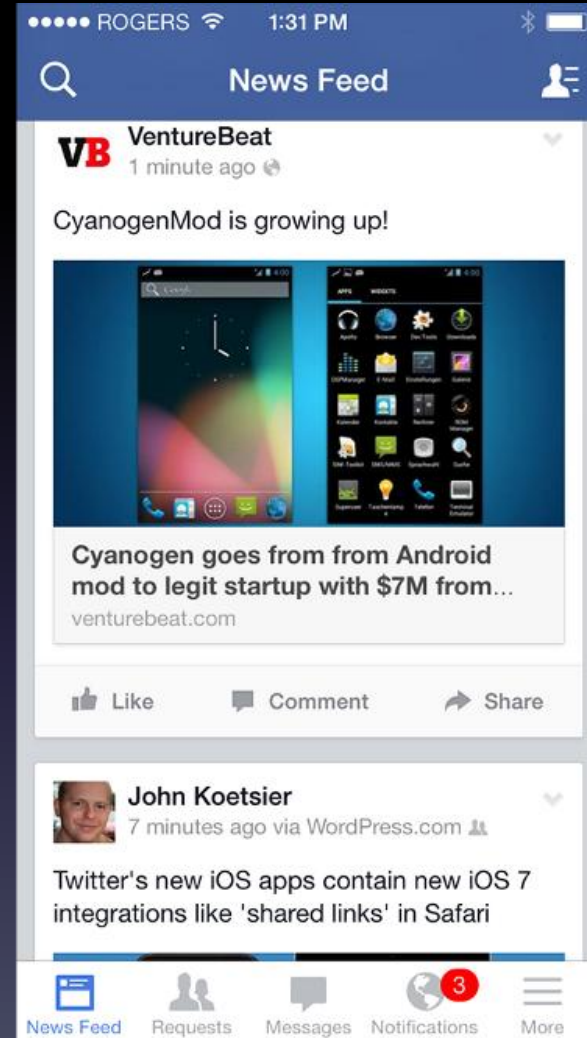
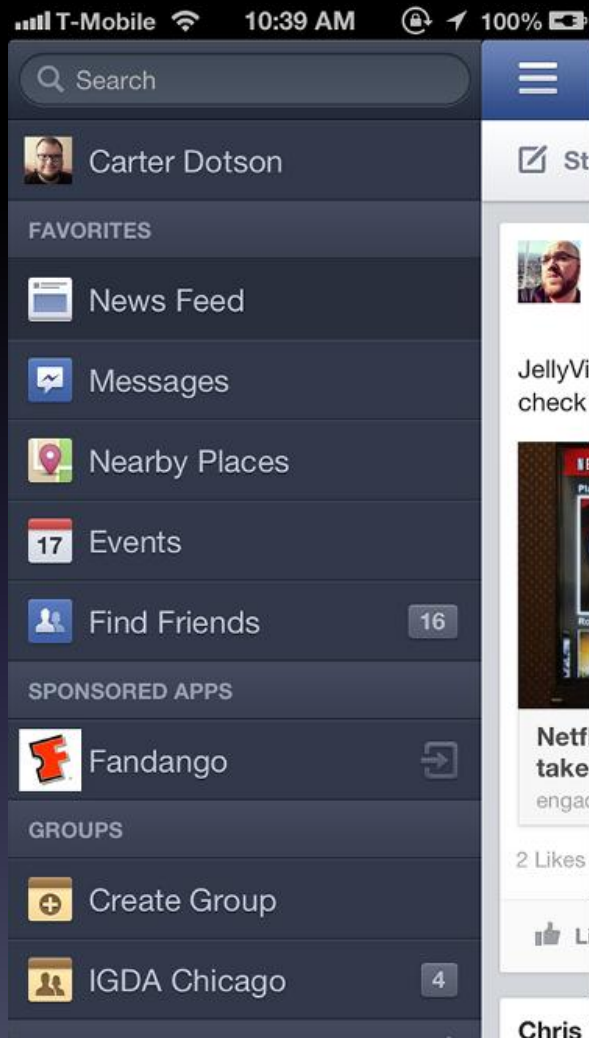
- **There are no silver bullets (黑科技) to solve essential complexity. Trying to abstract away essential complexity only makes things more complex. Shortcuts are just a distraction.**
- **Chose the solution optimized for the users, not for the company or our engineering force**

# Facebook 3.0

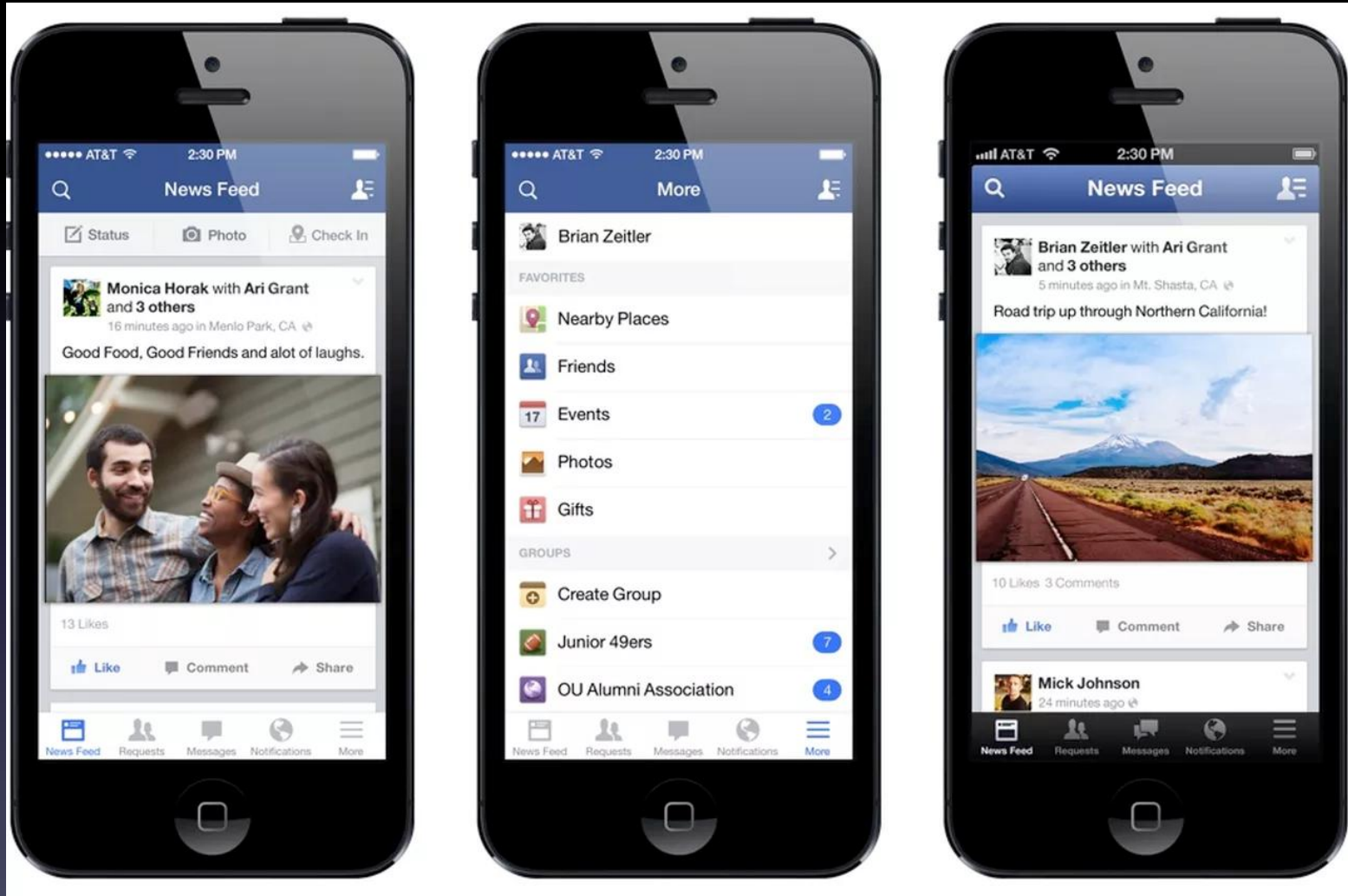




# Facebook 3.0



# Facebook 3.0



# Facebook 3.0

- Rewrite to native app  
Kimon & Scott Goodson era
- Main feature (heavily interactive) → native  
Others → Webview
- Three threads model for perf
  - Network thread
  - UI rendering thread
  - Main thread (UIKit)

# Facebook 3.0 启示

- **Performance boosted**
- **However, 20% crash rate → Async rendering**
  - **CALayer for async rendering**
  - **Error in Apple's documentation**
- **Delayed by 6 months**
- **Core data → CoreDataModel + Immutable**

Statue Quo of

The current Facebook iOS  
app





Write Post



Upload Photo/Video



Take Photo/Video



Write Post



Upload Photo/Video



Take Photo/Video



View Profile

# Current Facebook

- **90%+ Native, no interface builder, no storyboard.**
- **Try to switch to React Native**
  - **HTML for UI layout**
  - **UI layout code reuse**
- **Multiple apps strategy + shared libs (a lot)**



**Take Away**  
**of Facebook app**  
**for us**

# How to scale the mobile team

# Team sandwich

Release Team: Release & Stabilization Process

Photos

Feed

Search

Places

Messages

Product Infrastructure Team: Shared Libraries

- Module based
  - Product/Feature team works on module. Self contained.
- Navigate using module manager
- URL based

# Modules



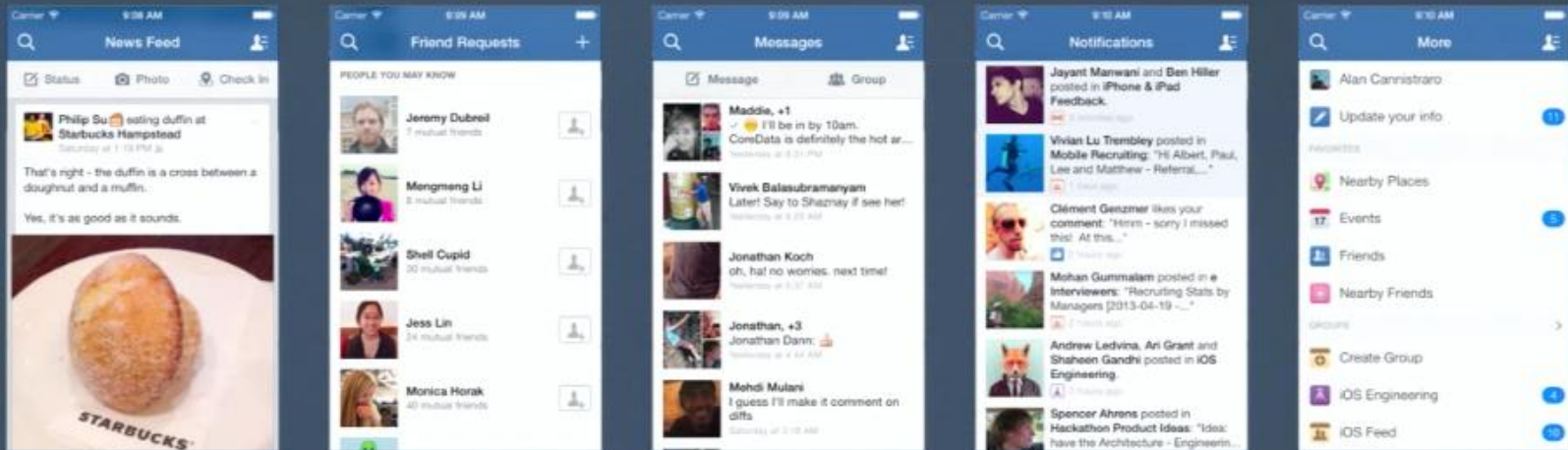
News Feed

[fb://profile?id=209390455851982](https://fb://profile?id=209390455851982)



Timeline

# Modules



- Shared lite-weight shared libs  
(Buck / Cocoapods)
- Code review
  - Auto-build + unit test
  - ObjC / C++ lint
  - FBTracer
- CI / Building tools

# Multiple builds



Facebook



Facebook



Facebook



Facebook



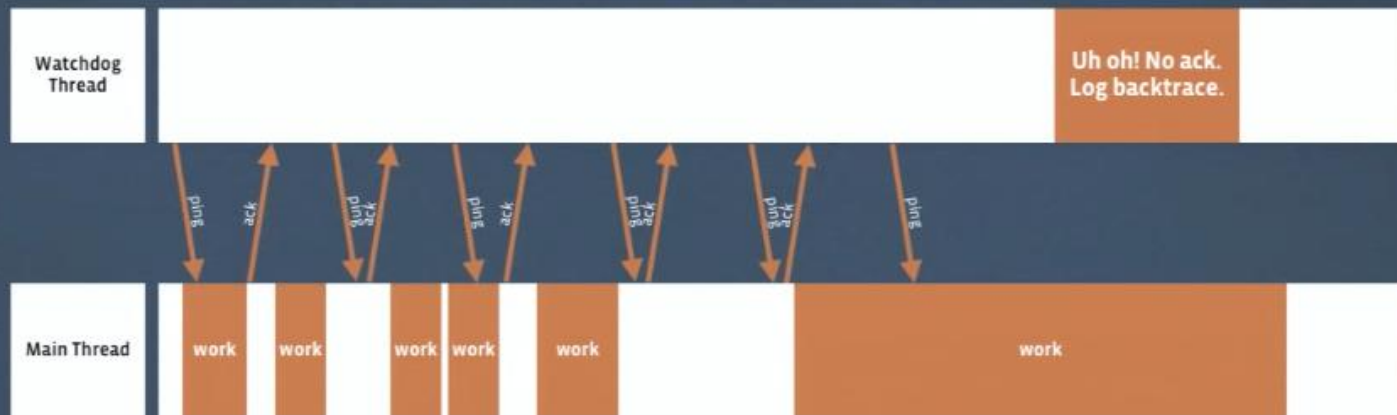
# Internal settings

Development dashboard

- Toggle features on and off
- Change parameters
- Trigger events



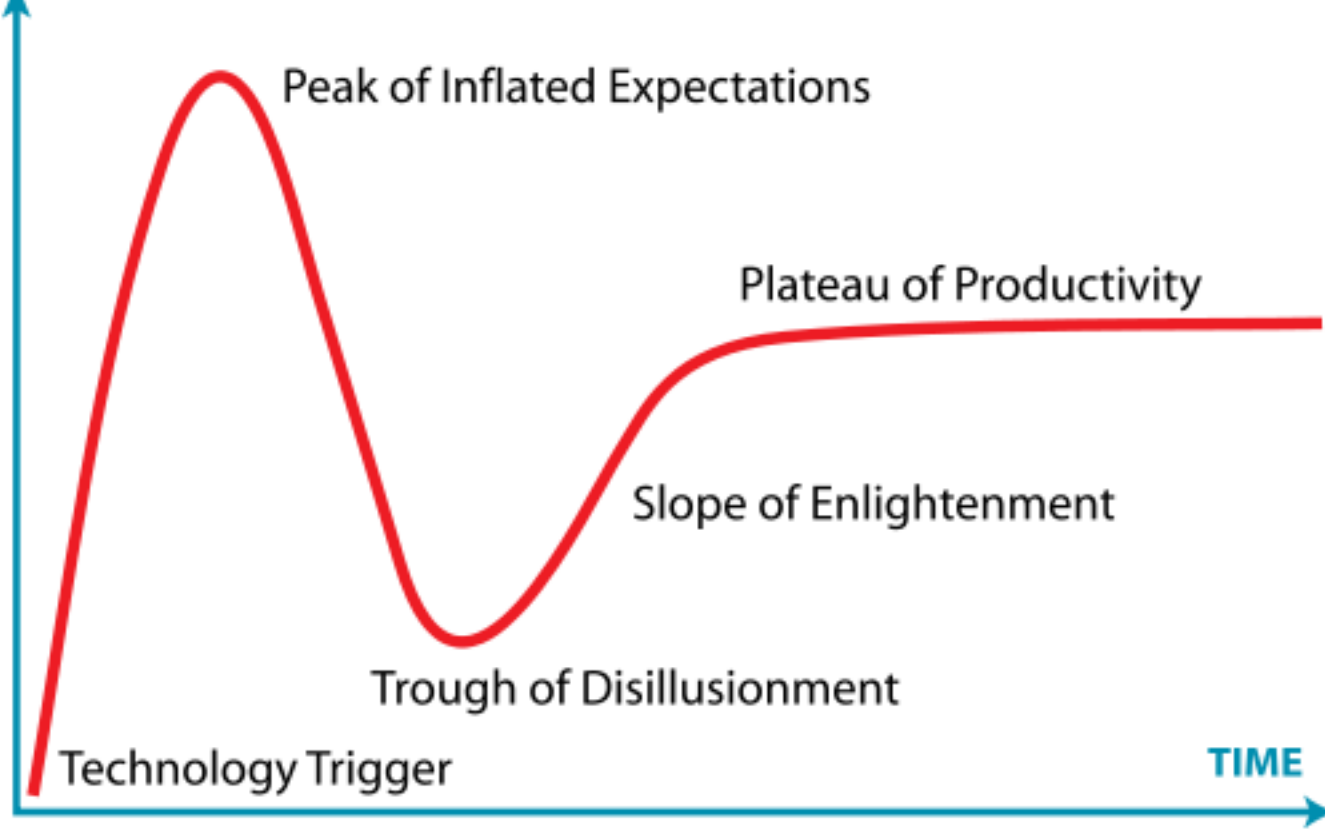
# Watchdog timer



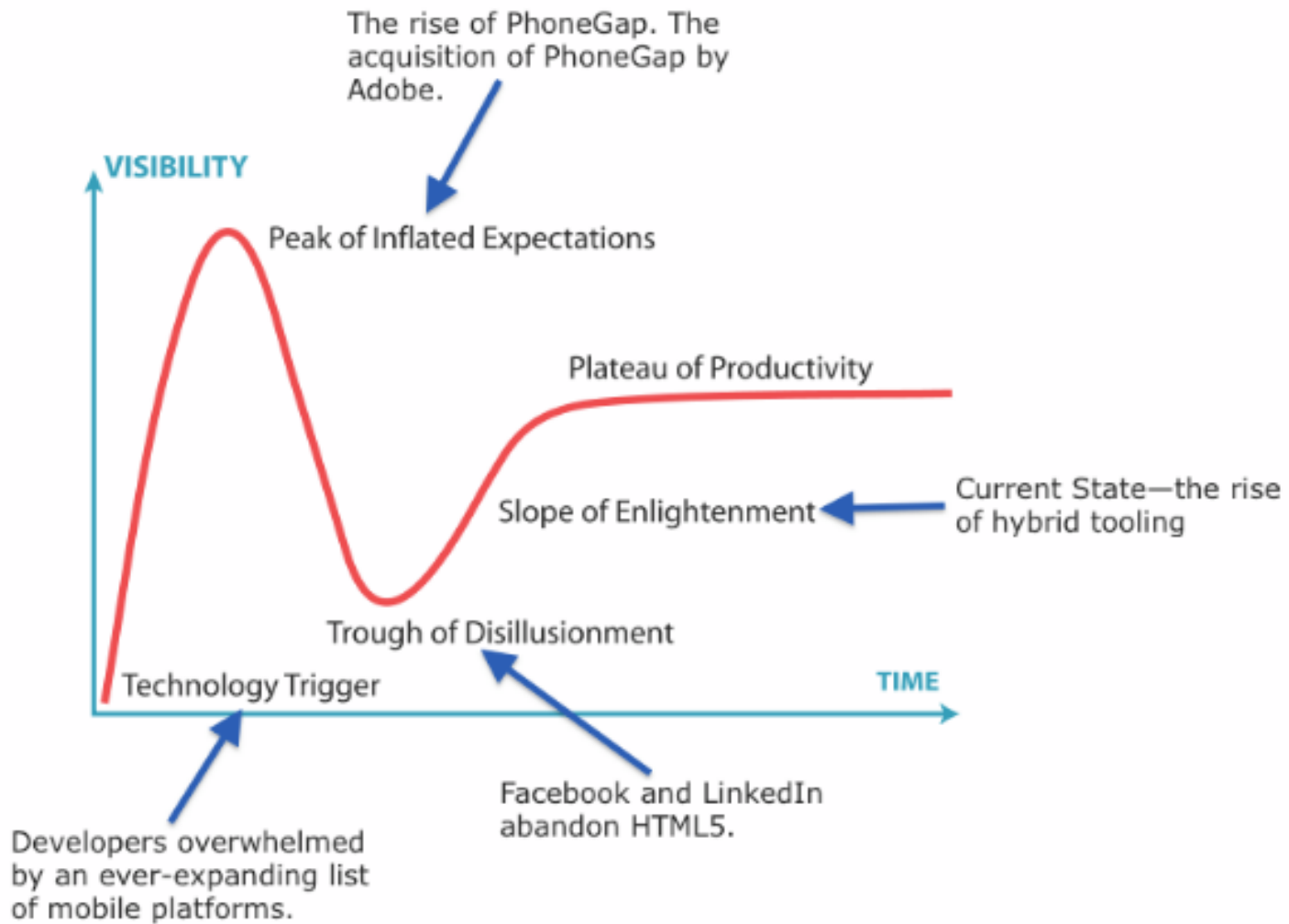
#2

HTML5 or 100% Native?

**VISIBILITY**



**TIME**



FIRST ▶ PLAY







# Lily Allen

## SHEEZUS

Listen to Album for Free + Pre-Order Now

### Hot Songs See All >

	Far Alone (feat. E-40 & Ja... G-Eazy	FREE
	Problem (feat. Iggy Azalea) Ariana Grande	\$1.29
	Fight Night Migos	\$1.29
	Everytime I Come Aro... 50 Cent	\$0.99

### New Releases See All >



Native

Web

Native

1. Native shell

2. For rich static content:

- restful API responding html string, with bridge JS;
- Fully optimized mobile page

3. React Native (early stage)

# THANKS



聚焦前沿技术 传递实践经验

主办方 **Geekbang** **InfoQ**  
极客邦科技