

CS50 for MBAs

Mobile Strategies

Last Time

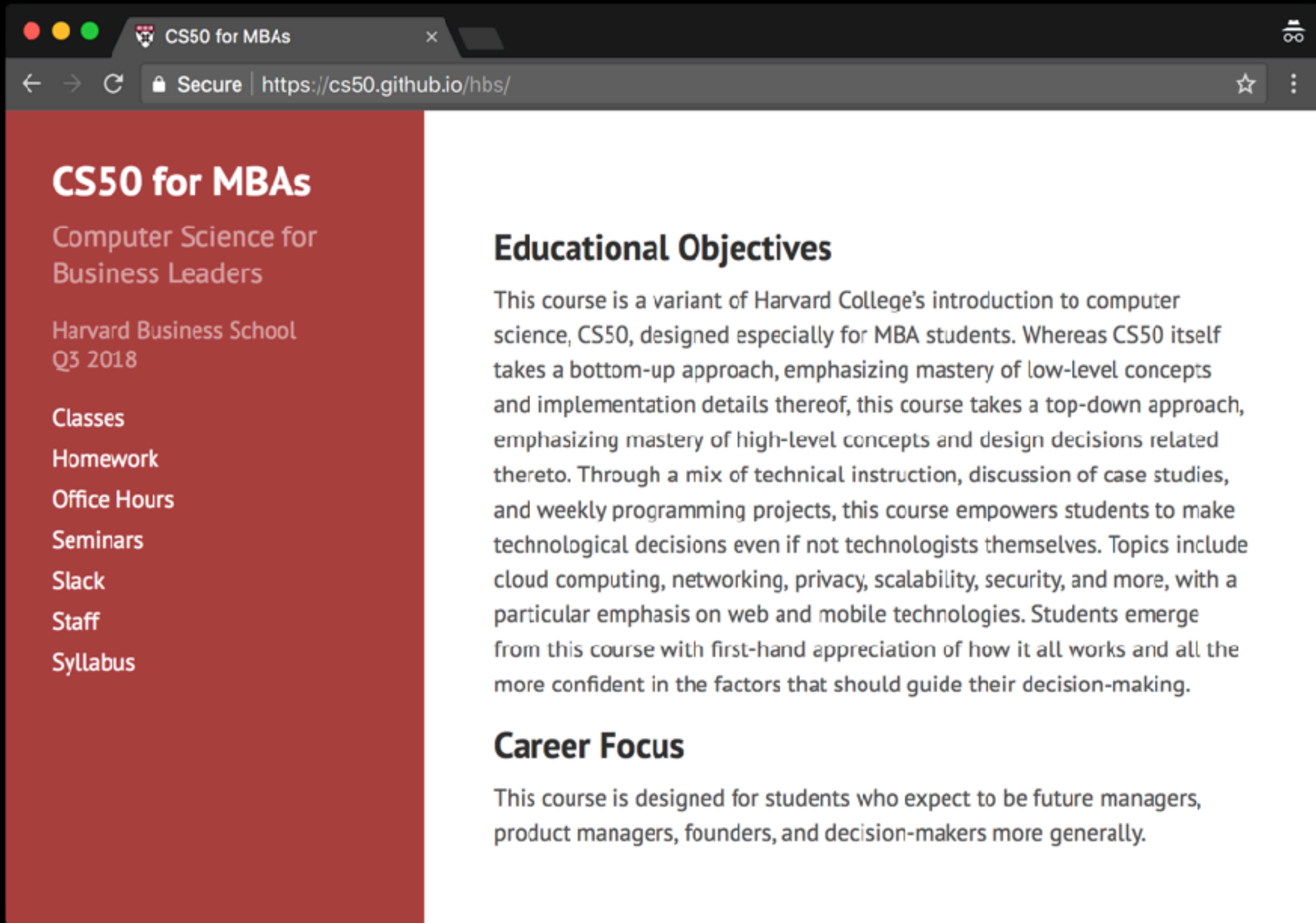
Web Programming

This Time

Mobile Strategies

- hybrid apps, native apps, web apps

Responsive Web Apps





CS50 for MBAs

Computer Science for Business
Leaders

Harvard Business School
Q3 2018

[Classes](#)

[Homework](#)

[Office Hours](#)

[Seminars](#)

[Slack](#)

[Staff](#)

[Syllabus](#)

Educational Objectives

This course is a variant of Harvard College's introduction to computer science, CS50, designed especially for MBA students. Whereas CS50 itself takes a bottom-up approach, emphasizing mastery of low-level concepts and implementation details thereof, this course takes a top-down approach,



HARVARD
BUSINESS SCHOOL



15 FEB 2018 COLD CALL

Black Business Leaders Series: John Rogers and the Importance of Hiring Minority-Owned Services Firms

Re: Steven Rogers

→ [More Cold Call Episodes](#)

21 FEB 2018 HBS WORKING KNOWLEDGE

When a Competitor Abandons the Market, Should You Advance or Retreat?

Re: Joshua Lev Krieger

→ [More HBS Working Knowledge](#)



**HARVARD
BUSINESS SCHOOL**



OLD CALL

Business Leaders

by Rogers and

Importance of Hiring

and Services

[isodes](#)

KNOWLEDGE

Abandons the

Advance or



ABOUT

MBA

HBX

DOCTORAL

EXECUTIVE
EDUCATION

ALUMNI

FACULTY &
RESEARCH

BAKER LIBRARY

CAMPAIGN

HARVARD BUSINESS
REVIEW

INITIATIVES

NEWS

RECRUIT

MAP / DIRECTIONS

- Bootstrap
- Foundation
- Semantic UI
- ...

Demo

Native Apps

- Android
- BlackBerry
- iOS
- Windows
- ...

- Android (Java/Kotlin)
- BlackBerry (Java)
- iOS (Objective-C/Swift)
- Windows (C#)
- ...

99.6 percent of new smartphones run Android or iOS

While BlackBerry's market share is a rounding error

by [James Vincent](#) | [@jjvincent](#) | Feb 16, 2017, 6:11am EST

Operating System	4Q16 Units	4Q16 Market Share (%)
Android	352,669.9	81.7
iOS	77,038.9	17.9
Windows	1,092.2	0.3
BlackBerry	207.9	0.0
Other OS	530.4	0.1
Total	431,539.3	100.0

thousands of units

[https://www.statista.com/statistics/266572/
market-share-held-by-smartphone-
platforms-in-the-united-states/](https://www.statista.com/statistics/266572/market-share-held-by-smartphone-platforms-in-the-united-states/)

<https://www.statista.com/statistics/266136/global-market-share-held-by-smartphone-operating-systems/>

[https://insights.dice.com/
2017/05/01/ios-android-users-
spending-habits/](https://insights.dice.com/2017/05/01/ios-android-users-spending-habits/)

Hybrid Apps

- React Native
- Titanium
- Vue
- ...

Tradeoffs

Web Apps

Web Apps

- + write code once
- + faster iteration
- + lower learning curve
- slower performance
- limited access to device APIs
- no App/Play Store, home screen icon

Native Apps

Native Apps

- + fast performance
- + no limitations on device APIs
- + higher learning curve
- new language per platform
- slower iteration speed
- APIs constantly changing

Hybrid Apps

Hybrid Apps

- + fast iteration speed
- + write code mostly once
- + reasonable performance
- reliant on 3rd party framework
- relatively immature
- some limits on API access

Understand Your Use Case

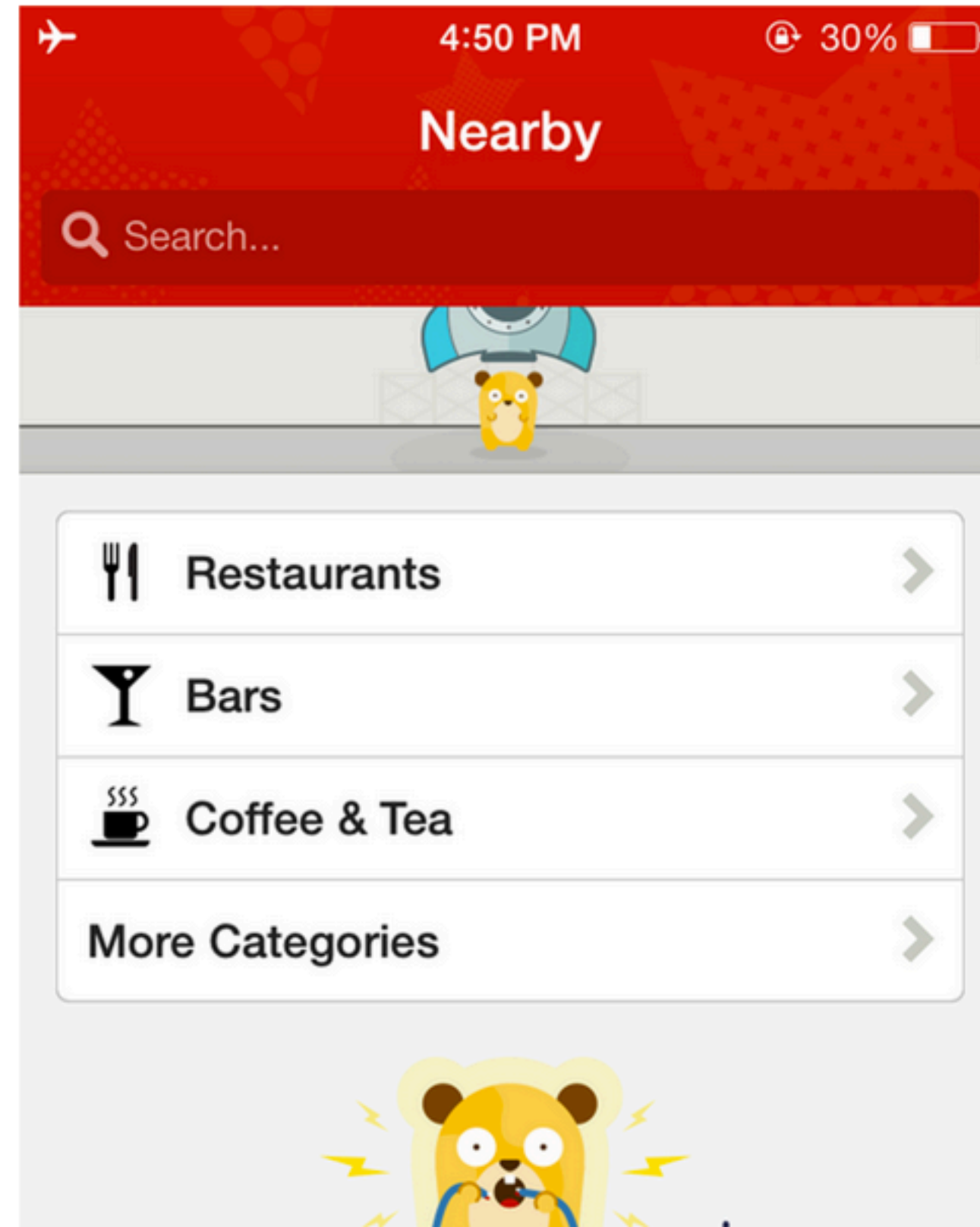
Quora



Yelp: [Design](#) [Yelp API](#) [iOS Applications](#) [iOS Design](#) [Edit](#)

★ **Why does the Yelp iOS app use hamsters in their loading animations and error screens?** [Edit](#)

They're so cute!



Yoni De Beule, Product Design Manager at Yelp

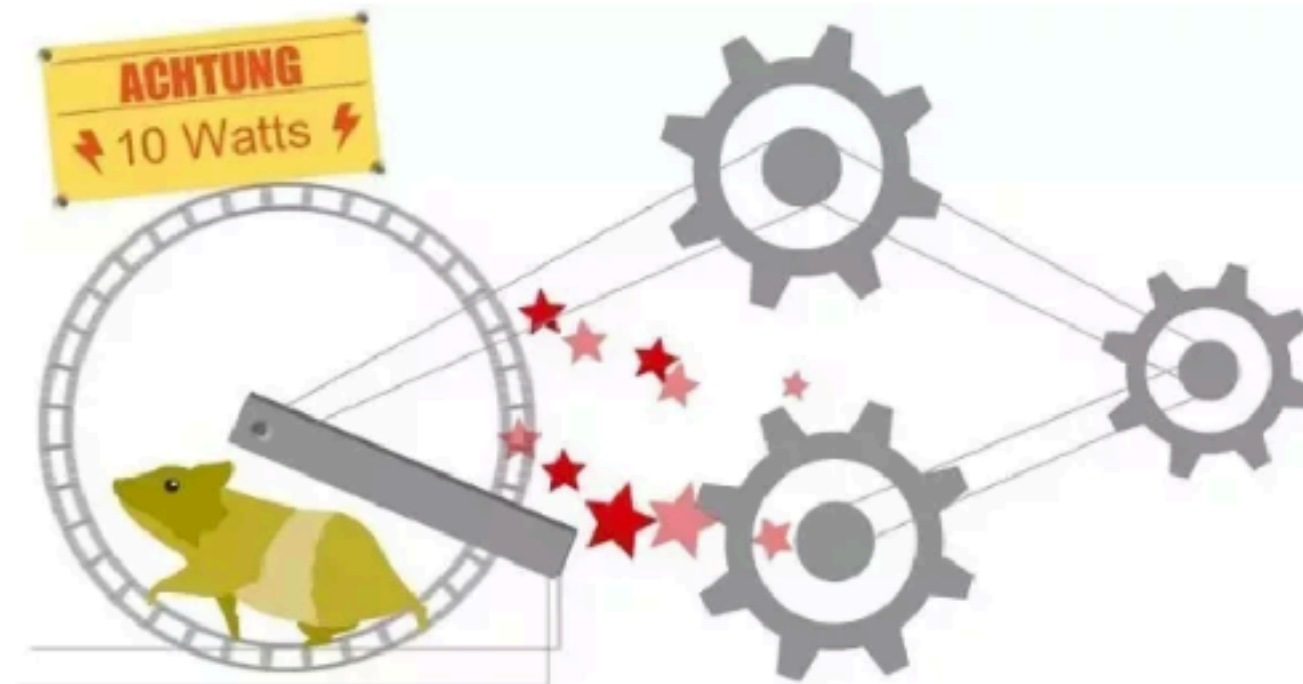
Answered Jan 10, 2014 · Featured on Forbes · Upvoted by Amanda Lim and Tom Abraham, worked at Yelp

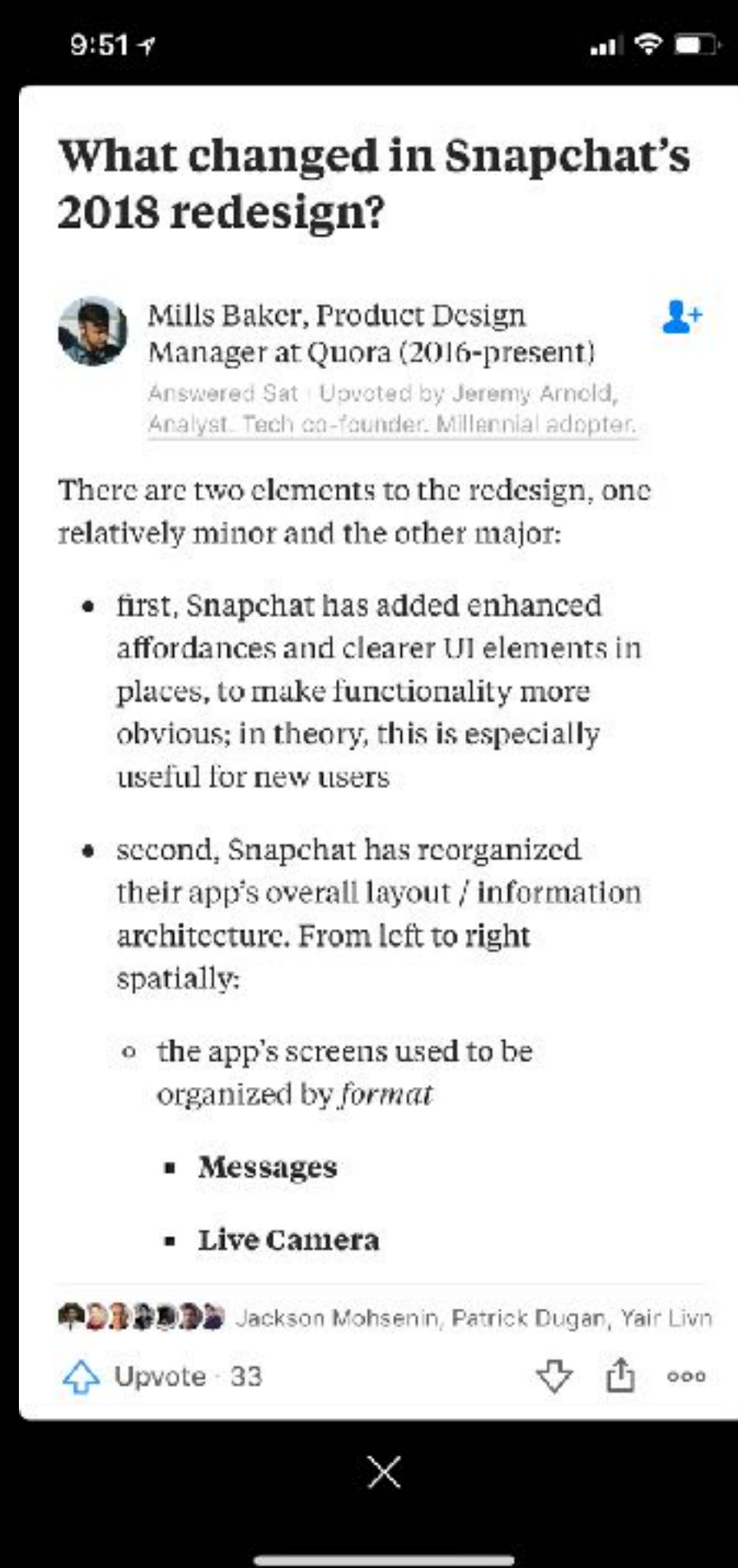
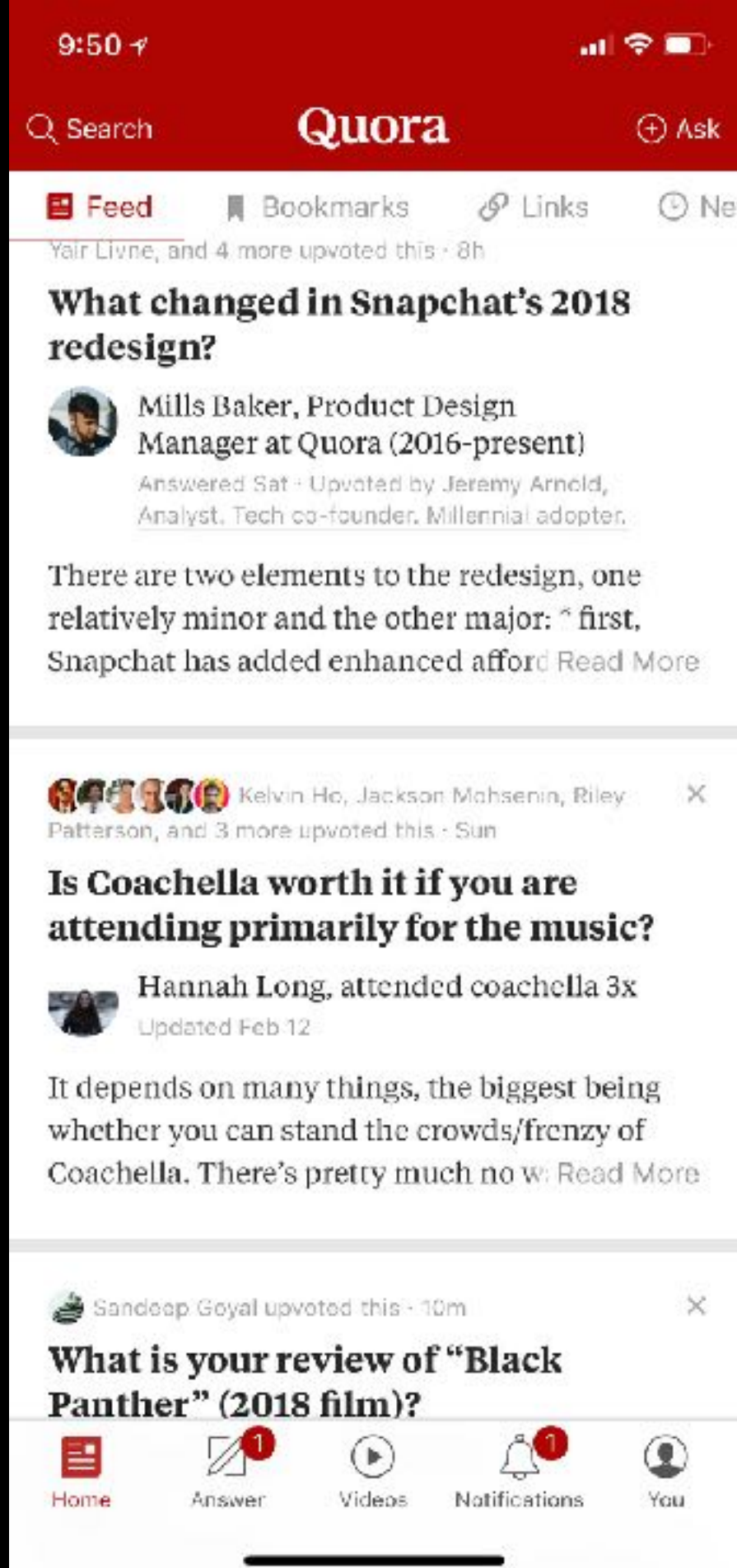


At Yelp we're always striving to make our product and brand feel fun and delightful. We reflect Yelp's personality in everything from our [fun poster designs](#) and [funny release notes](#) to [internal hackathon projects](#) and [Yelp Elite parties](#).

When we found our iPhone settings page to be seriously lacking in the fun department, we decided to roll up our sleeves and fix it. We were quickly drawn to the idea of adding a hidden element to the bottom of the settings page. A user would have to pull up to reveal the easter egg.

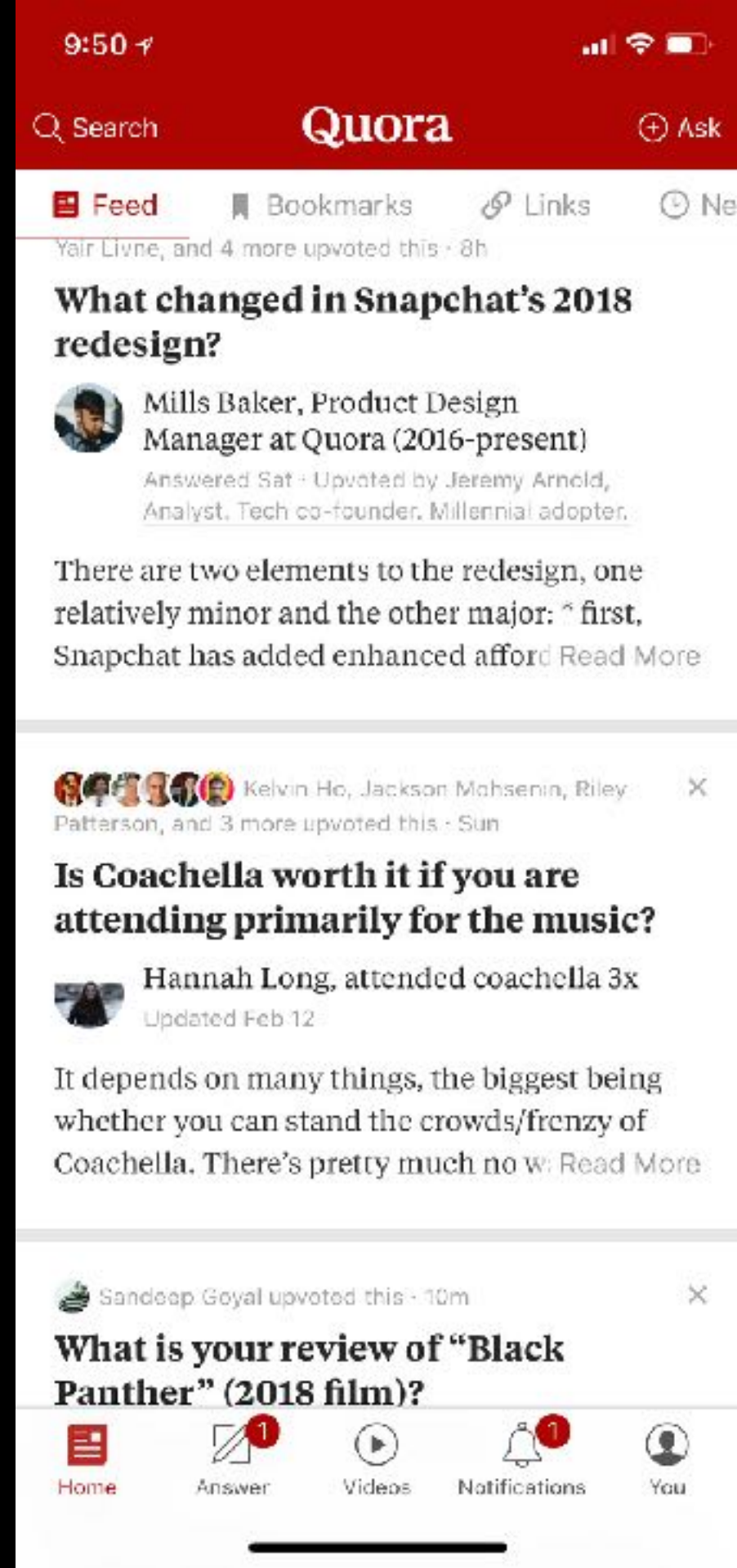
Initial ideas that included a flower Yelp burst illustration were scrapped as the burst is actually an asterisk (as explained [here](#) by the esteemed [Michael Ernst](#)). We all quickly fell in love with a hamster wheel proposal Michael made. Why a hamster? Why not a hamster!





Hybrid

Native



Web

Team Structure

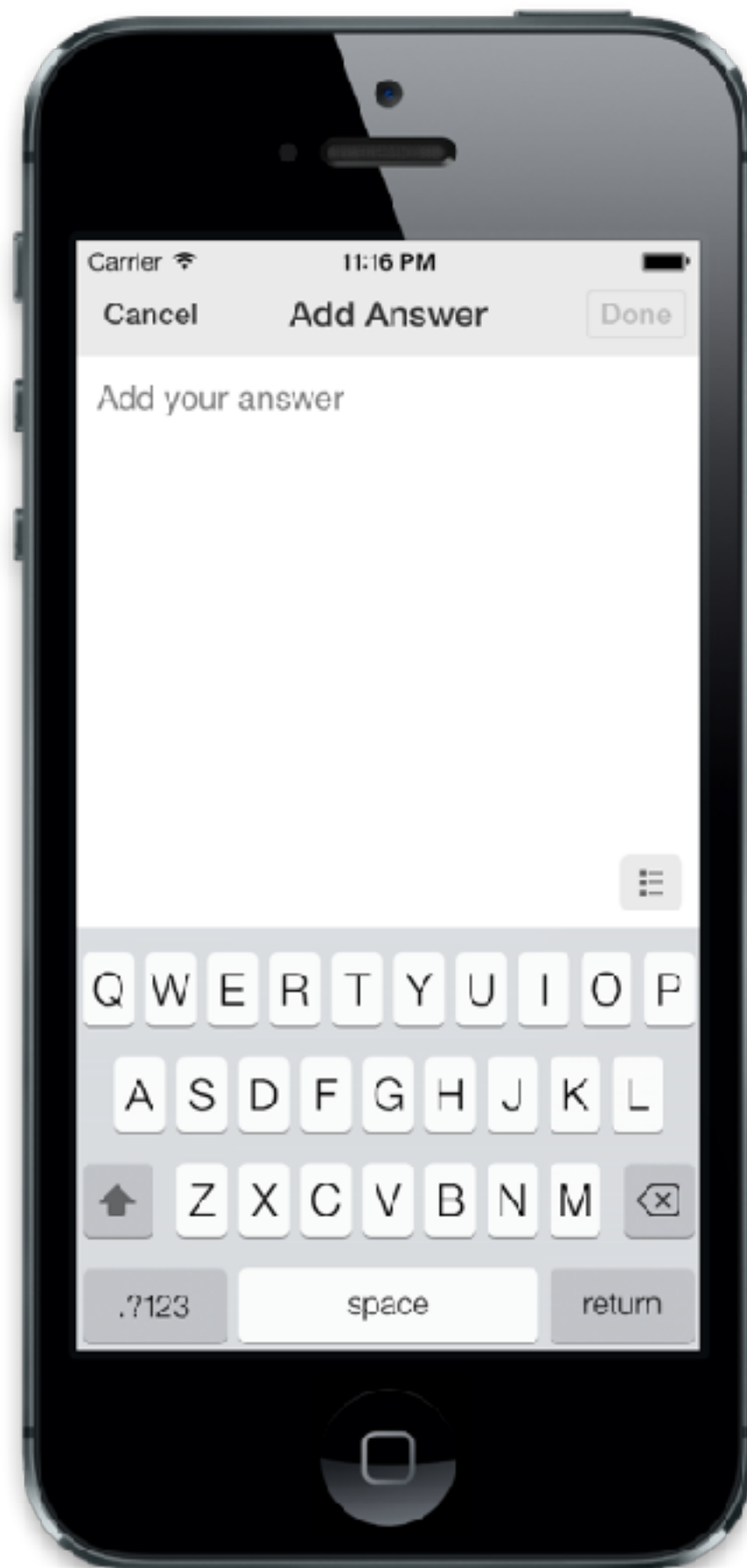
- Every engineer writes for mobile
- Development happens mobile-first
- Small core team writes native features
- Focus on generalizable APIs

Tradeoffs

- Development velocity is top priority
- Don't need high performance
- Need APIs like push notifications, home screen

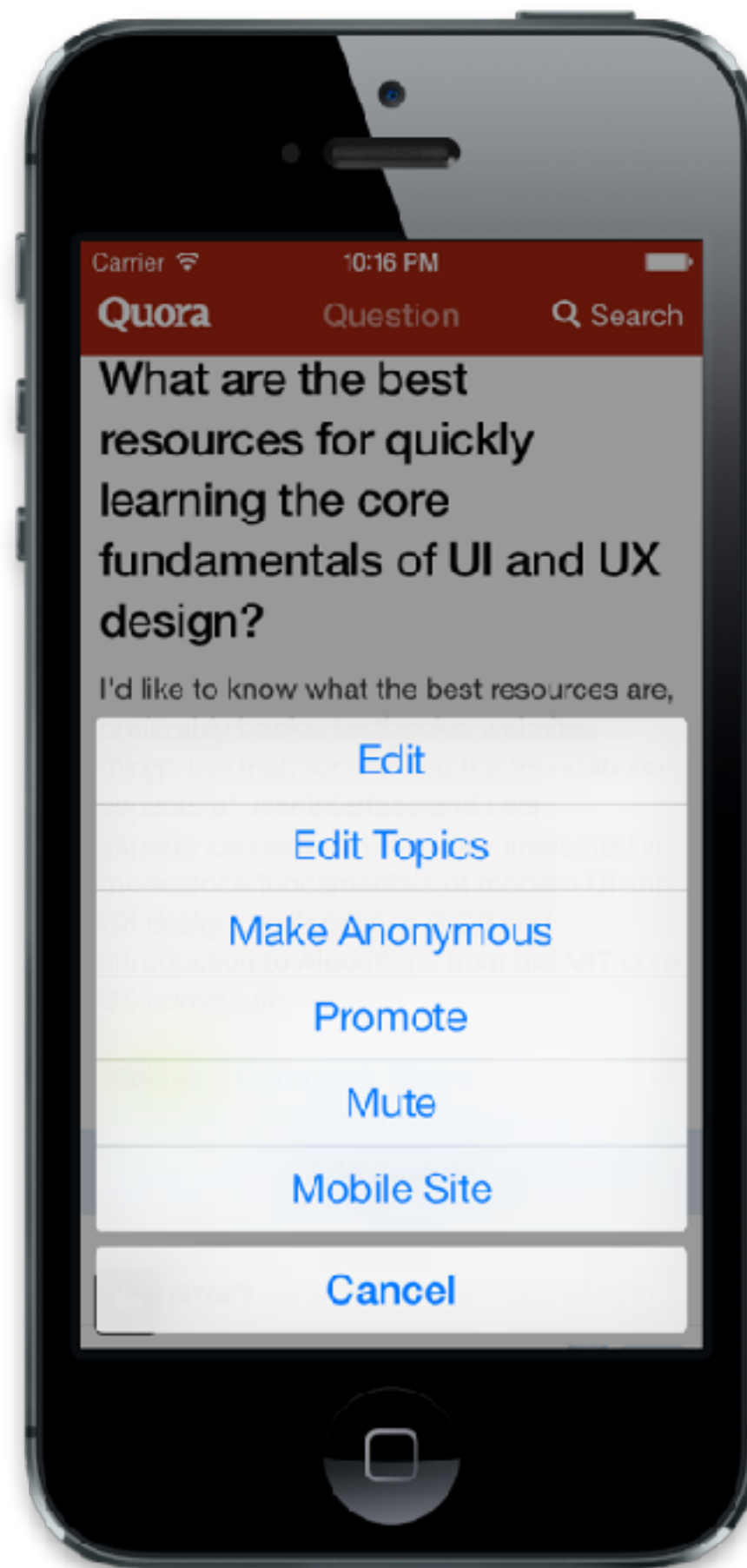
Web-Native Bridge

Message Passing




```
var options = {  
    title: 'Add Answer',  
    type: 'text',  
    placeholder: 'Add your answer',  
};
```

```
client.sendMessageToClient(  
    'invokeEditor', options  
);
```



```
var options = {
  buttonTitles: [
    'Edit',
    'Edit Topics',
    ...
  ],
  callback: function(data) {
    if (data.index == 0)
      ...
  }
};

client.sendMessageToClient(
  'showActionSheet', options
);
```

```
window.webkit.messageHandlers
```

window

.webkit

.messageHandlers

.SomeMessageName

.postMessage()

```
WKWebView.evaluateJavaScript( )
```

Example

Interface

'invokeEditor'

'openURL'

'showActionSheet'

'showAlert'

Implementation

```
public void openURL(Object data) {  
    // Java  
}
```

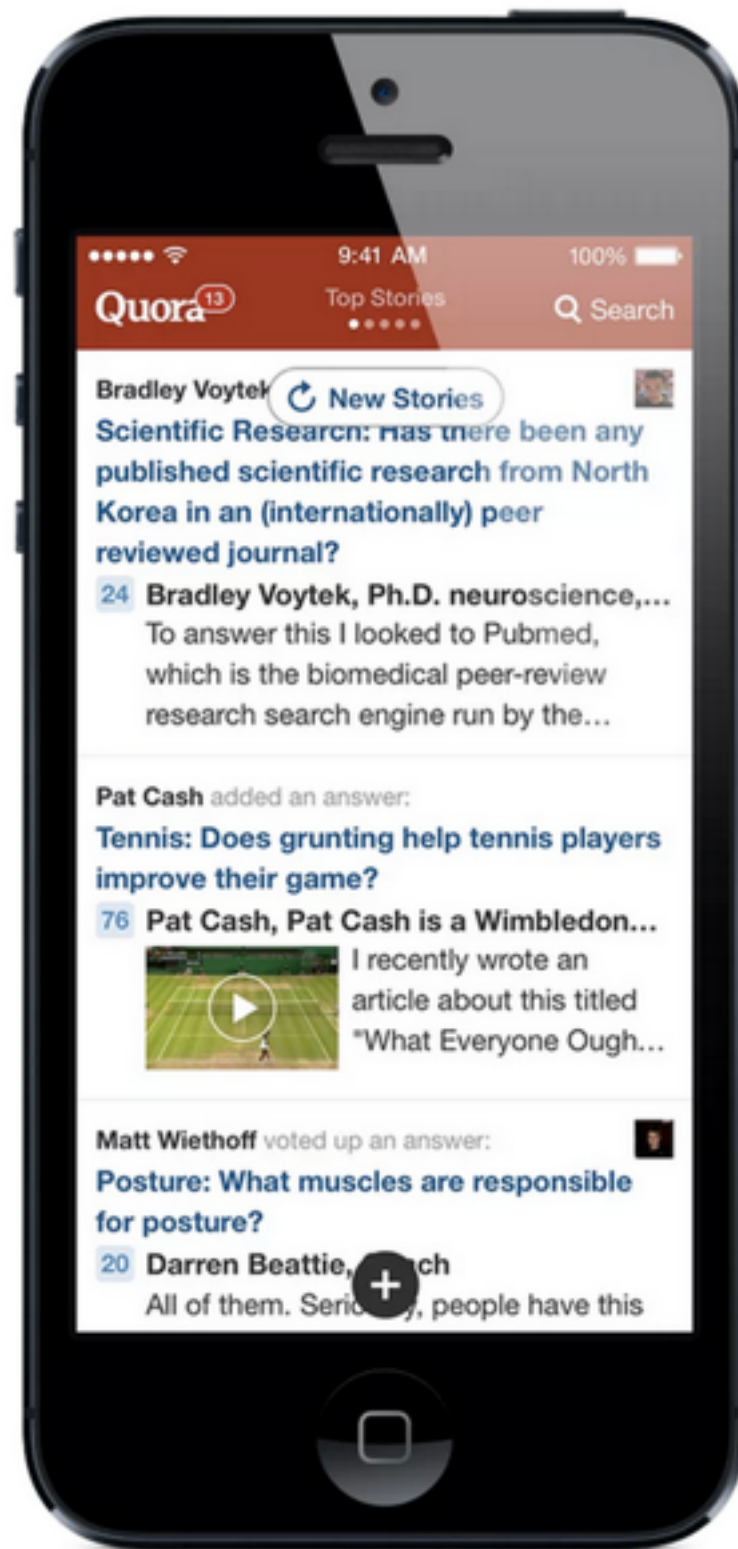
```
func openURL(data: Object) {  
    // Swift  
}
```

Minification

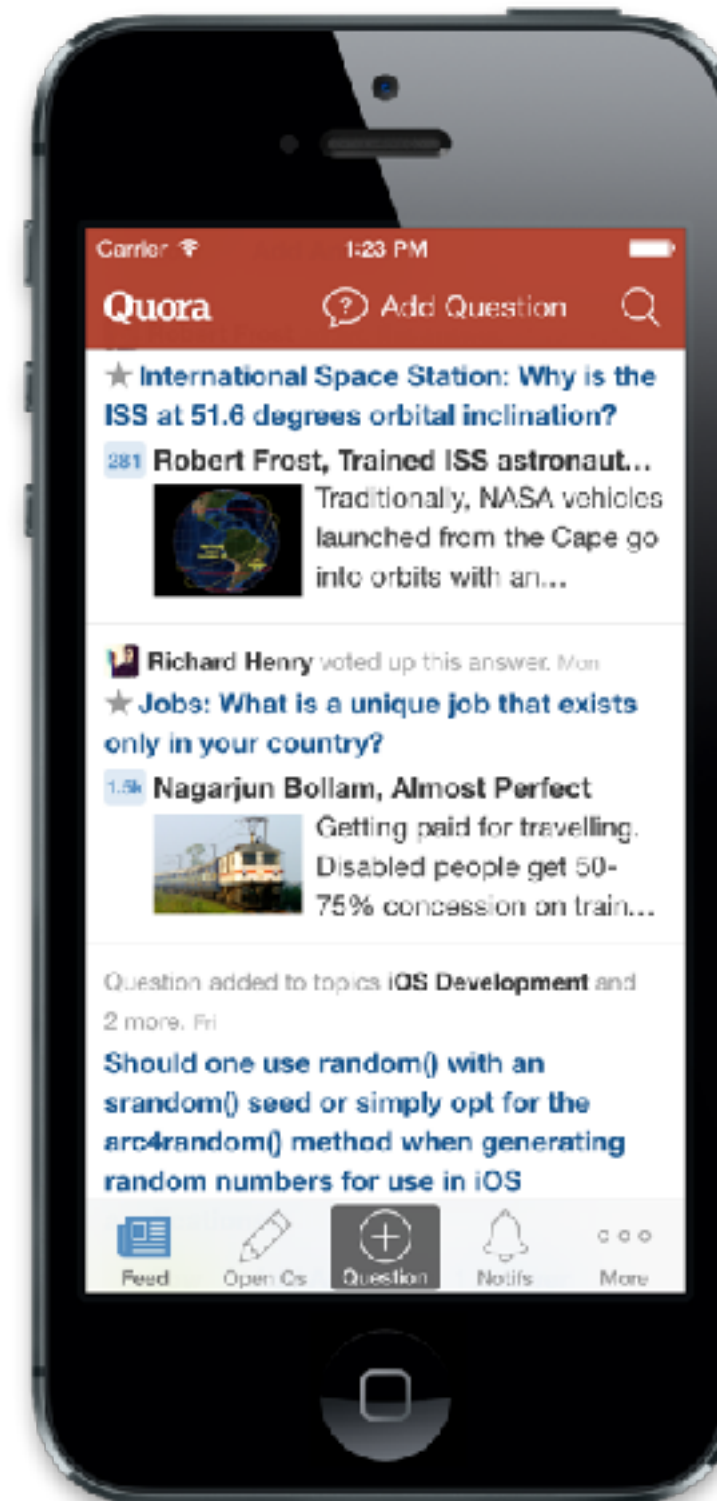
A/B Testing

- Generate a hypothesis
- Implement the experiment
- Measure impact

- **Generate a hypothesis**
- Implement the experiment
- Measure impact



A



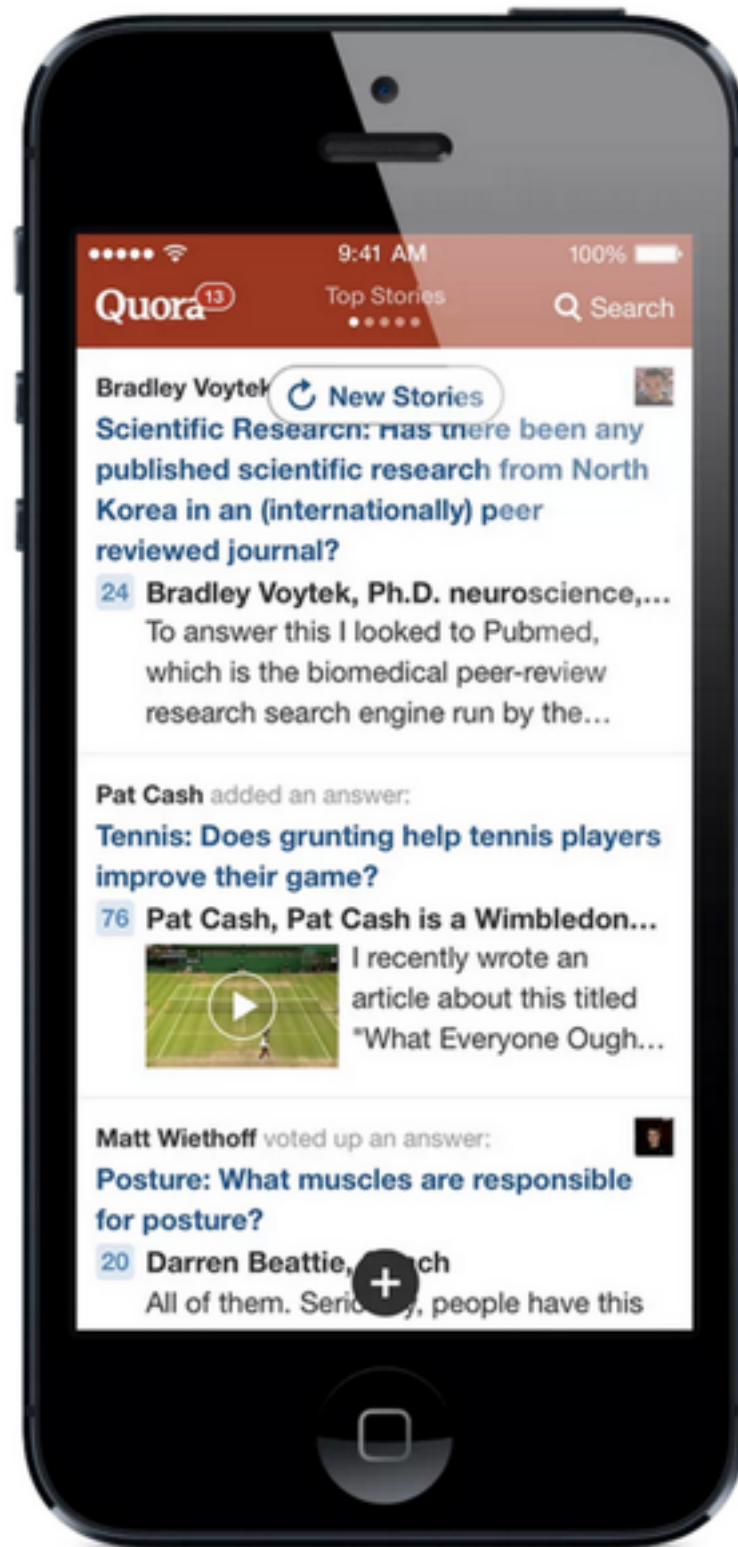
B

“It’s easier to add a question”

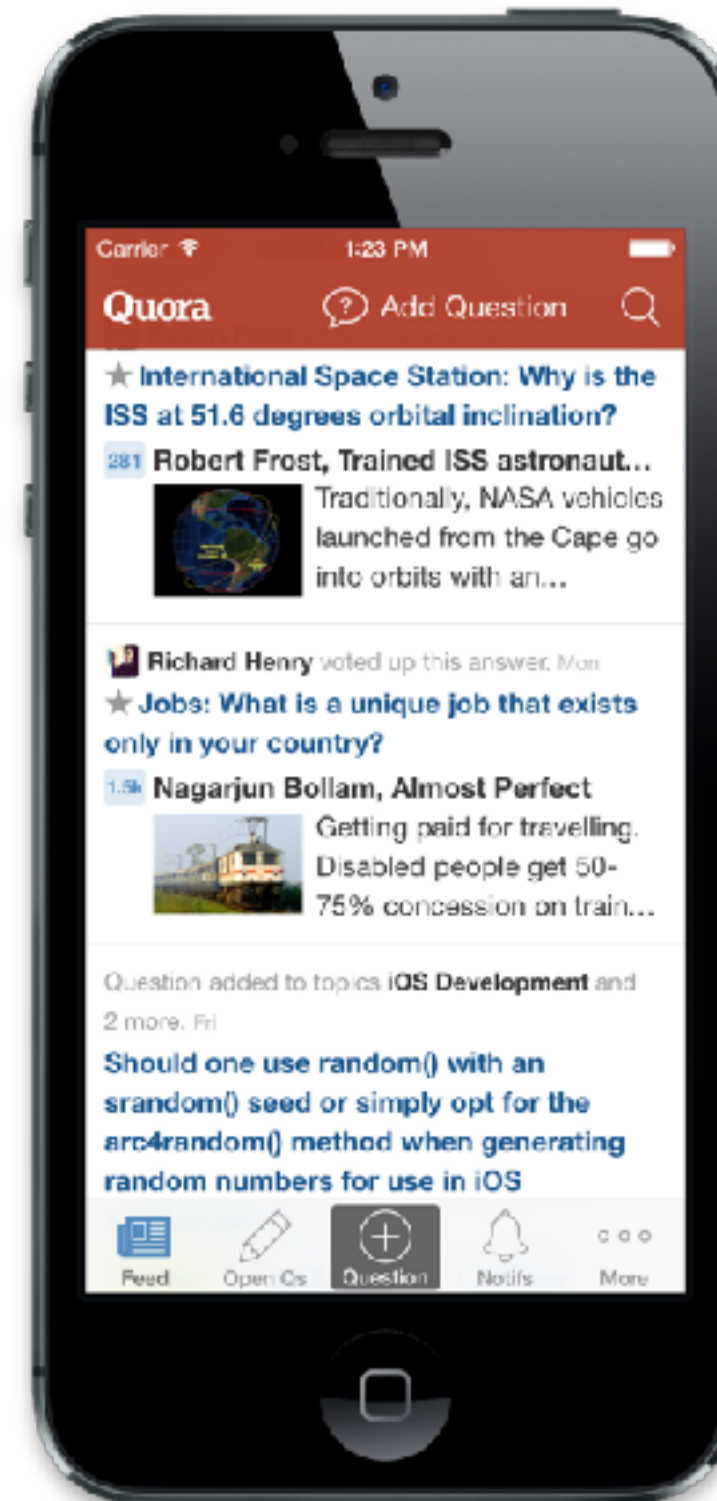
“There’s more UI in the
way of content”

“Swipe gestures are trendy
right now”

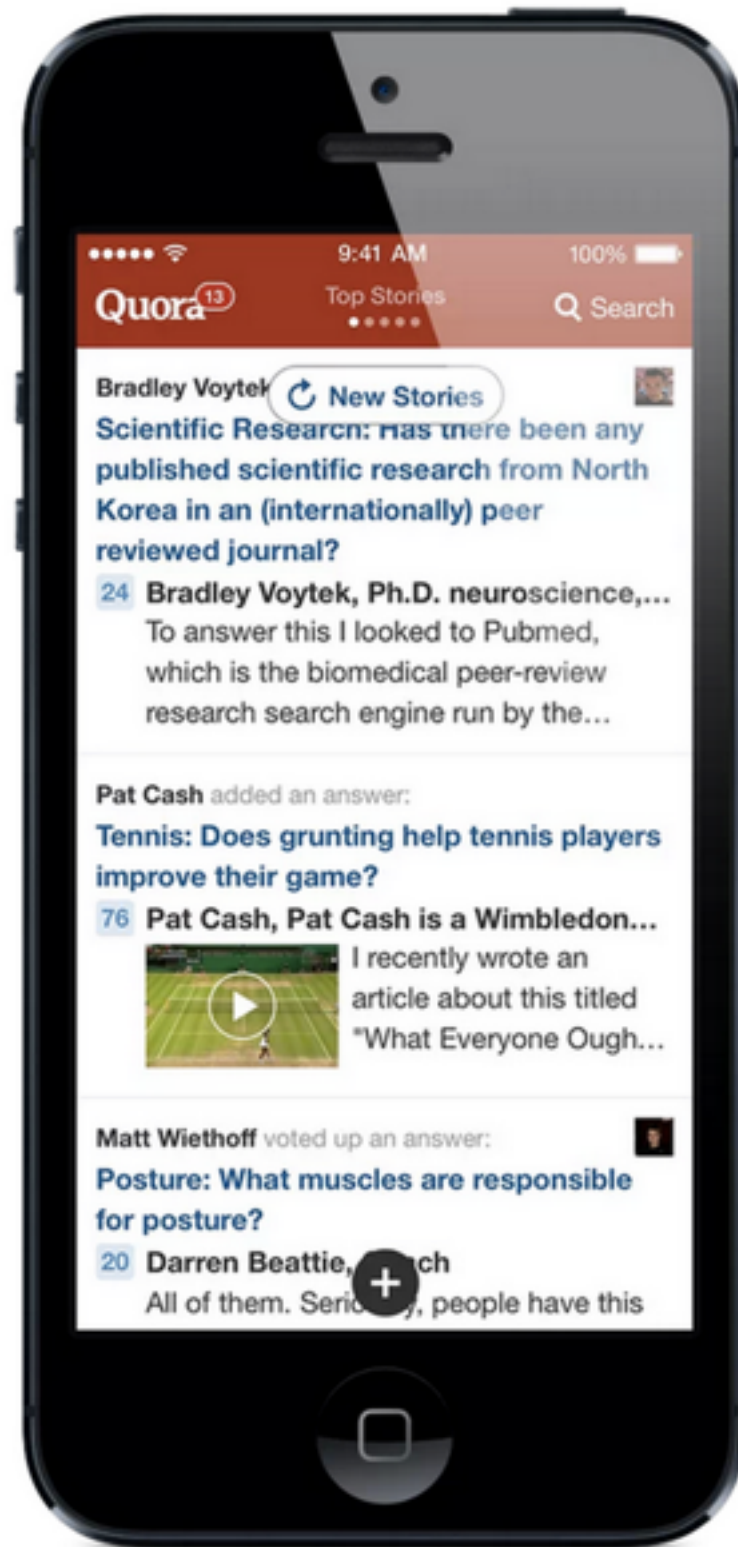
- Generate a hypothesis
- **Implement the experiment**
- Measure impact



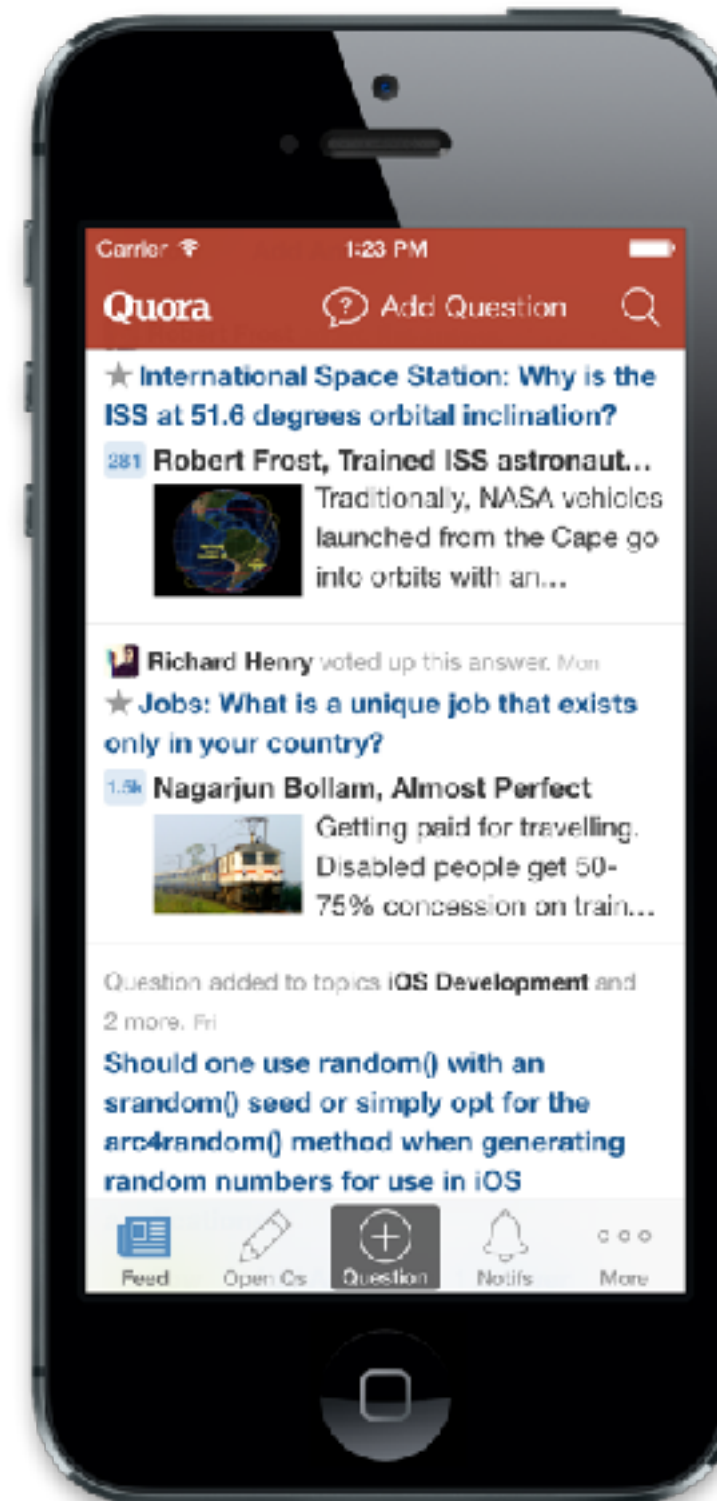
A



B



70%



30%

```
define_experiment('tab_bar',  
    buckets=[  
        (range(0, 30), True),  
        (range(30, 100), False)  
    ]  
)
```



```
def render():  
    if experiment.get('tab_bar'):  
        return render_with_bar()  
    else:  
        return render_without_bar()
```

- Generate a hypothesis
- Implement the experiment
- **Measure impact**

- Fabric
- Mixpanel
- Optimizely
- ...

- Engagement?
- Performance?
- Cost?
- Complexity?

Tradeoffs

Q&A

Next Time

Technology Stacks

CS50 for MBAs

Mobile Strategies