

The background of the slide features a wide-angle landscape of a mountain range under a dramatic sky with scattered clouds. In the foreground, a dark rectangular overlay contains the main text.

# This class, mobile app basics, and Hybrid apps

## Secure Mobile IoT Application Development

**Dr. Hale**

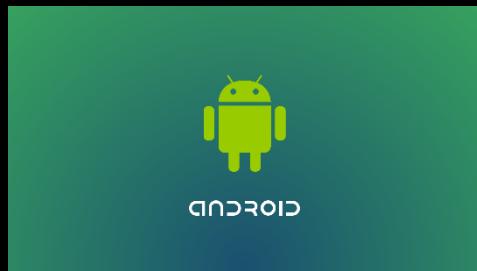
University of Nebraska at Omaha  
Secure Mobile IoT Development– Lecture 1

Welcome to CYBR8480 (8080)

# What is this class?

Short story: We will be making mobile apps and IoT apps.

# Ok so what will we cover?



(Review)



*ember*<sup>(Review)</sup>



IoT and Wearable Development

Technologies

# Ok so what will we cover?

Software Engineering: Architecting and design (review)

Software project management and Team dynamics (review)

Hardening and secure coding in the IoT SDLC

Bluetooth LE (smart) protocol

Hybrid App development

Native App development

Wearables and IoT Security issues

IoT Pen. testing

Topics

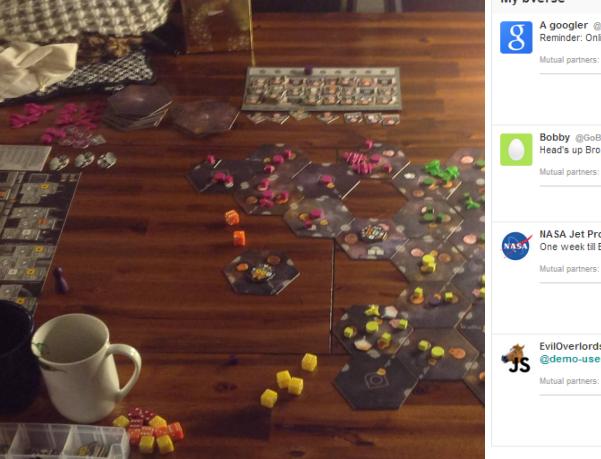
# Who am I

- I'm a nerd, a philosopher, an artist, a board gamer, and a software engineer.
- I'm here to challenge you. Life is meaningless if you never know (and push) your limits. ‘Non est ad astra mollis e terris via’ – (There is no easy way from the earth to the stars) – Seneca

## and Why should you trust me?

- I've made stuff (mostly highly interactive and visual web apps).
- I've also helped students make stuff and seen the looks of pride on their faces when they make stuff they never thought they could make.
- I believe in you and want to see you succeed.

# Who am I



**bVERSE Social Network**

Home Email Web Your status

**My bVerse**

**A googler @google**  
Reminder: Online Marketing 101 starts July 22! Sign up to learn the basics of online advertising  
Mutual partners: Campfire Woods, NASA, Posix Timber, and 6 others

+ Not Following 4 minutes ago

**Bobby @GoBro**  
Head's up Bro. Things are changing.  
Mutual partners: someone, and someone

Following 4 minutes ago

How trustworthy is this? 10 9 8 7 6 5 4 3 2 1 (Trust) (Trust) Example Accept Msg (Don't trust) (Don't trust) Example Reject Msg

**NASA Jet Propulsion Laboratory @NASAJPL**  
One week till Earth's Day 19 #WaveAtSaturn. View these charts to know when & where to look: 1.usa.gov/12TMUd  
Mutual partners: Matt Hale, Dr Who, The Sun, and A Googler

Following 4 minutes ago

How trustworthy is this? 10 9 8 7 6 5 4 3 2 1 (Trust) (Trust) (Don't trust) (Don't trust) Example Reject Msg

**EvilOverlords @terriblecompany**  
@demo-user We should do business...follow me back and we can partner up.  
Mutual partners: none

4 minutes ago

How trustworthy is this?

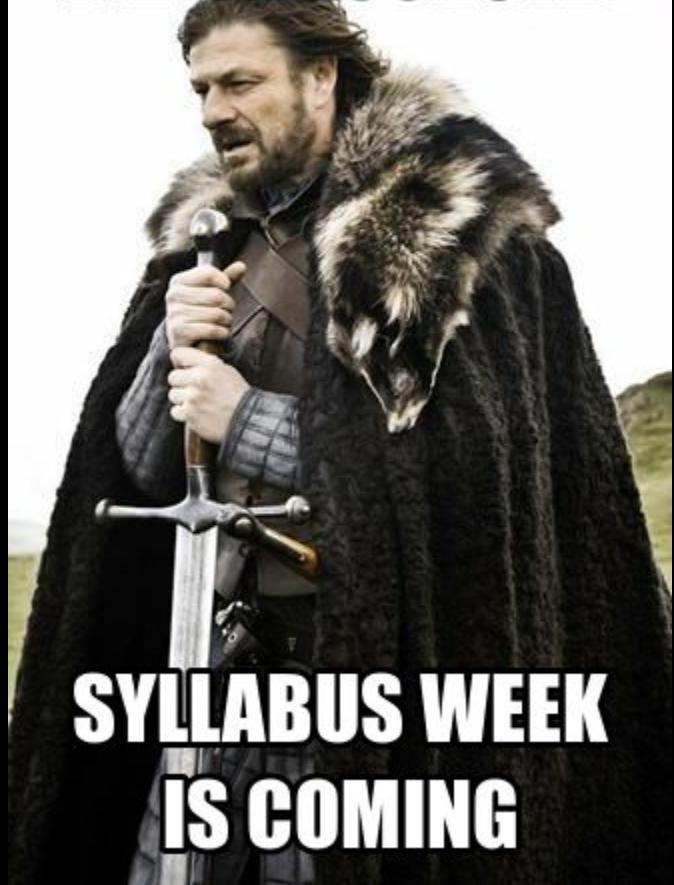


# Who are you?

- Something quirky about yourself
- Something you find interesting
- What motivates you?

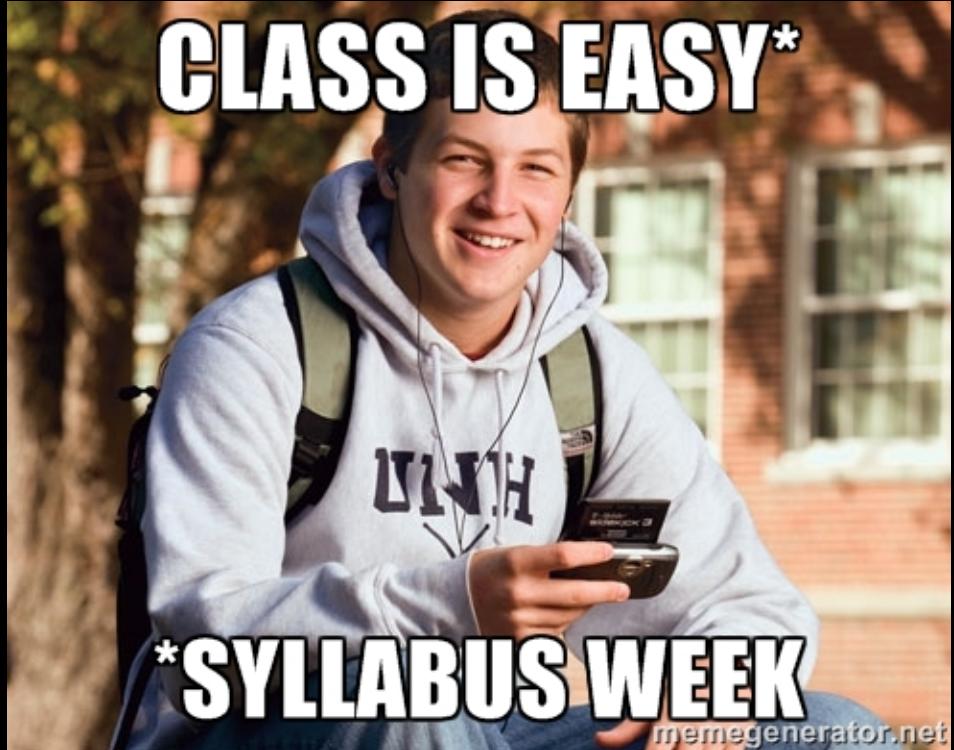


**BRACE YOURSELF**



**SYLLABUS WEEK  
IS COMING**

**CLASS IS EASY\***



**\*SYLLABUS WEEK**

memegenerator.net

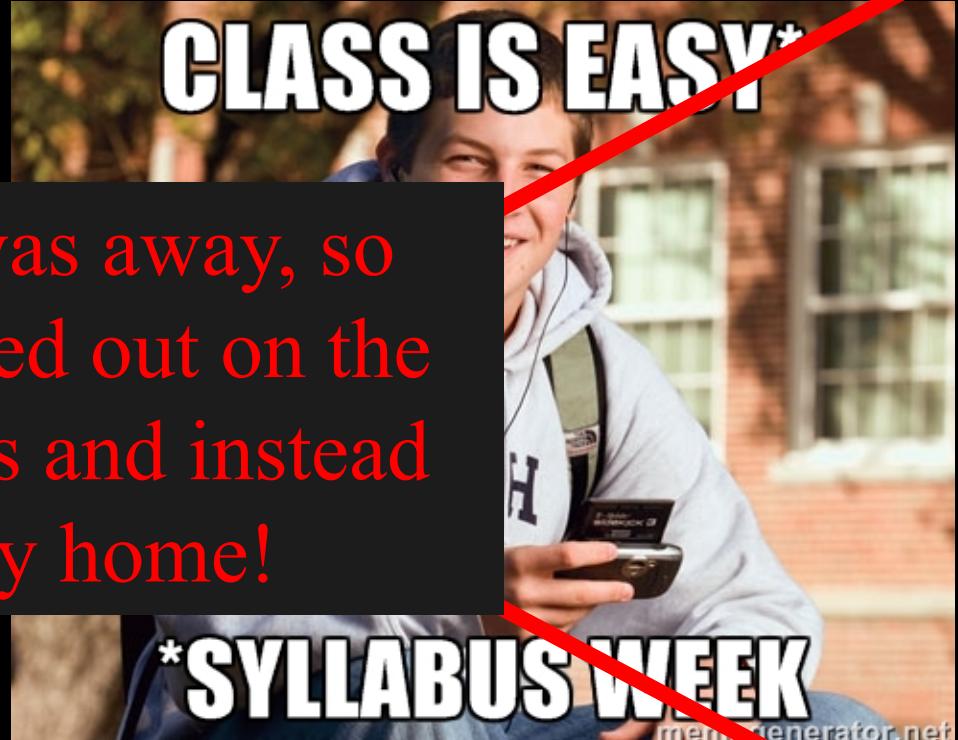
Hint: Syllabus time

# ~~BRACE YOURSELF~~



# ~~SYLLABUS WEEK IS COMING~~

# ~~CLASS IS EASY\*~~



# ~~\*SYLLABUS WEEK~~

memegenerator.net

Hint: Syllabus time

# Today's Class: Not spending the entire class on the syllabus

Foreword: Stuff you need to get, what to expect in this class

Content Part 1: Types of mobile apps

Statistics: threat vectors and vulnerabilities

Hybrid apps, native apps, web apps, oh my (architectures)

Content Part 2: More about hybrid apps and intro to first project

Native Containers

Internal Web apps

Cordova

Attack surface

Hands-on Part 3: Getting started

Foreword:

Stuff you need for this class:

No books

A smartphone or tablet, preferably Android, needs to be  
BLE capable

Ubertooth One (\$115) (I will provide these this year)

<http://hackerwarehouse.com/product/ubertooth-one/>

MetaWear (\$40)

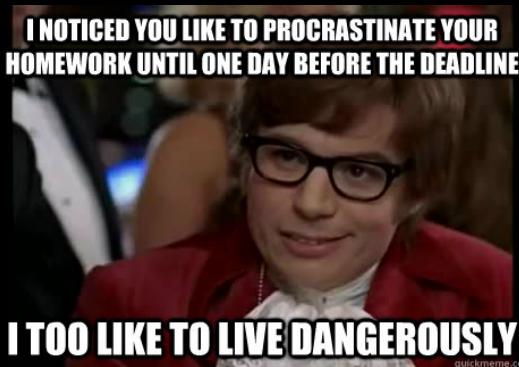
(R, RPRO, RG, C, or CPRO will work, R is the cheapest)

[https://store.mblab.com/product-  
category/application/wearables/](https://store.mblab.com/product-category/application/wearables/)

# Foreword:

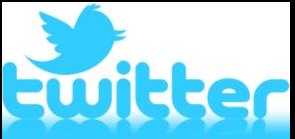
## What to expect from this class

- Mostly project development and lab time with a bit of lecture
- Hands-on step-by-step tutorials and then a freestyle project of your own
- No tests
- Lots of projects (don't procrastinate)
- self-referential (bad) humor in slides



## Part1:

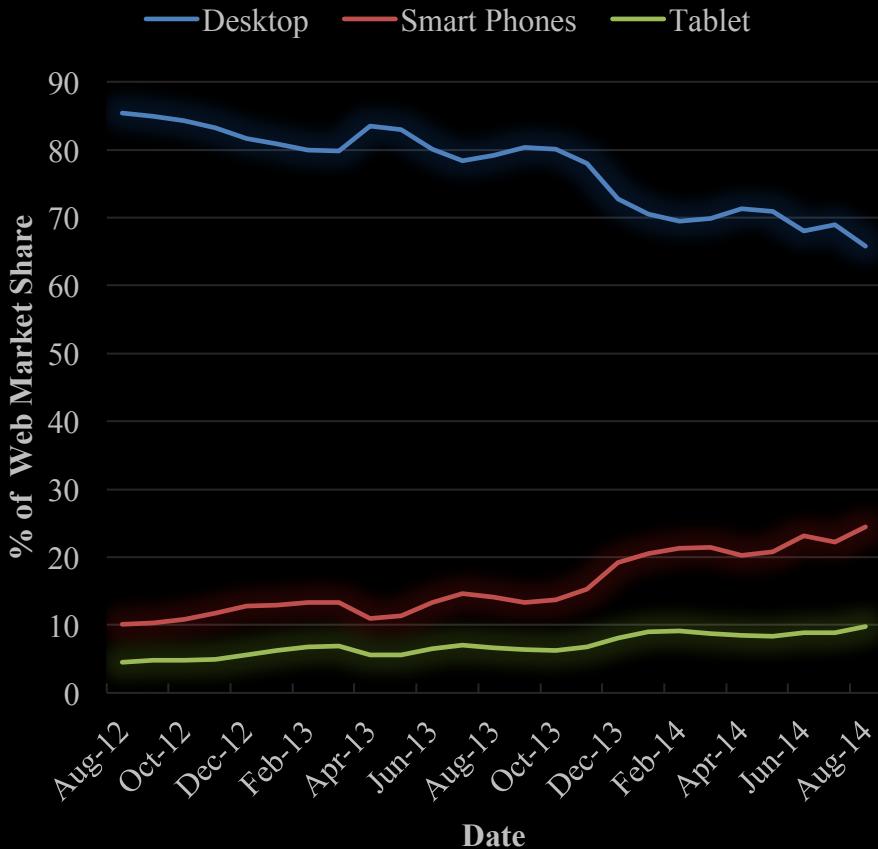
Lets talk a little about the different types of mobile apps.



(nearly) All companies have a mobile app.  
You probably use them, **daily**.



# The Growth of Mobile



Face reality as it is, not as it was  
or as you wish it to be

- Jack Welch (former GM CEO)

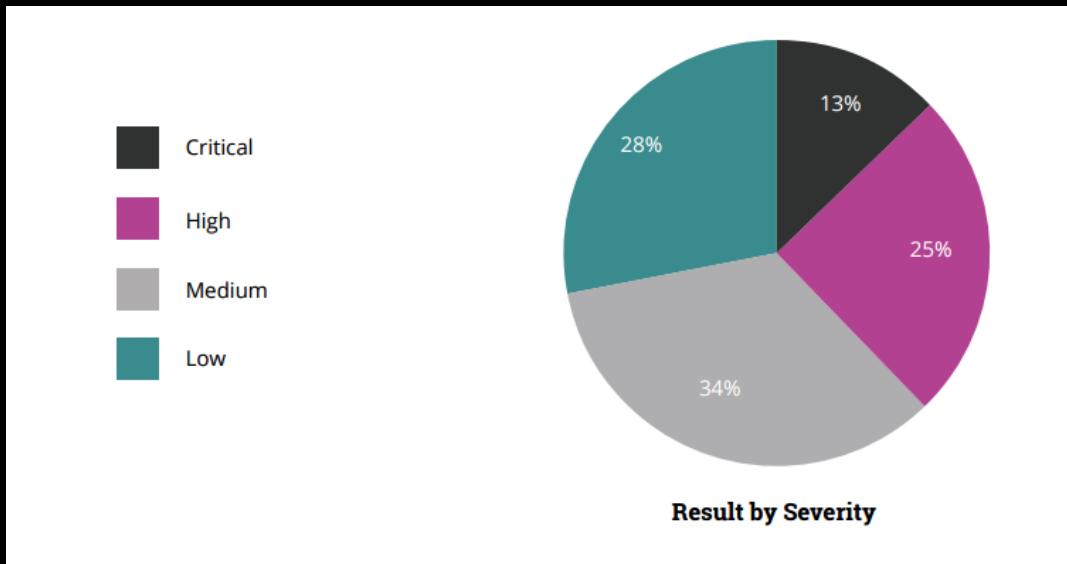
As a user, you expect mobile apps to be:  
**fast, responsive, connected, and secure**

Despite your expectations...

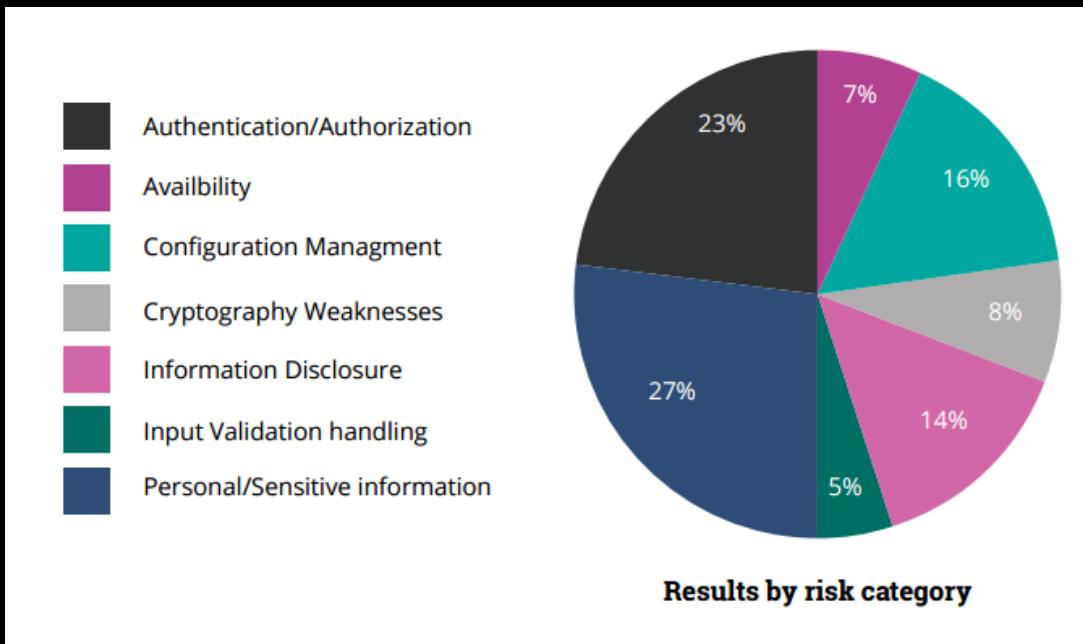
Most mobile applications have vulnerabilities\*

\*9.041 Vulnerabilities per app on average

# ...decomposition by criticality



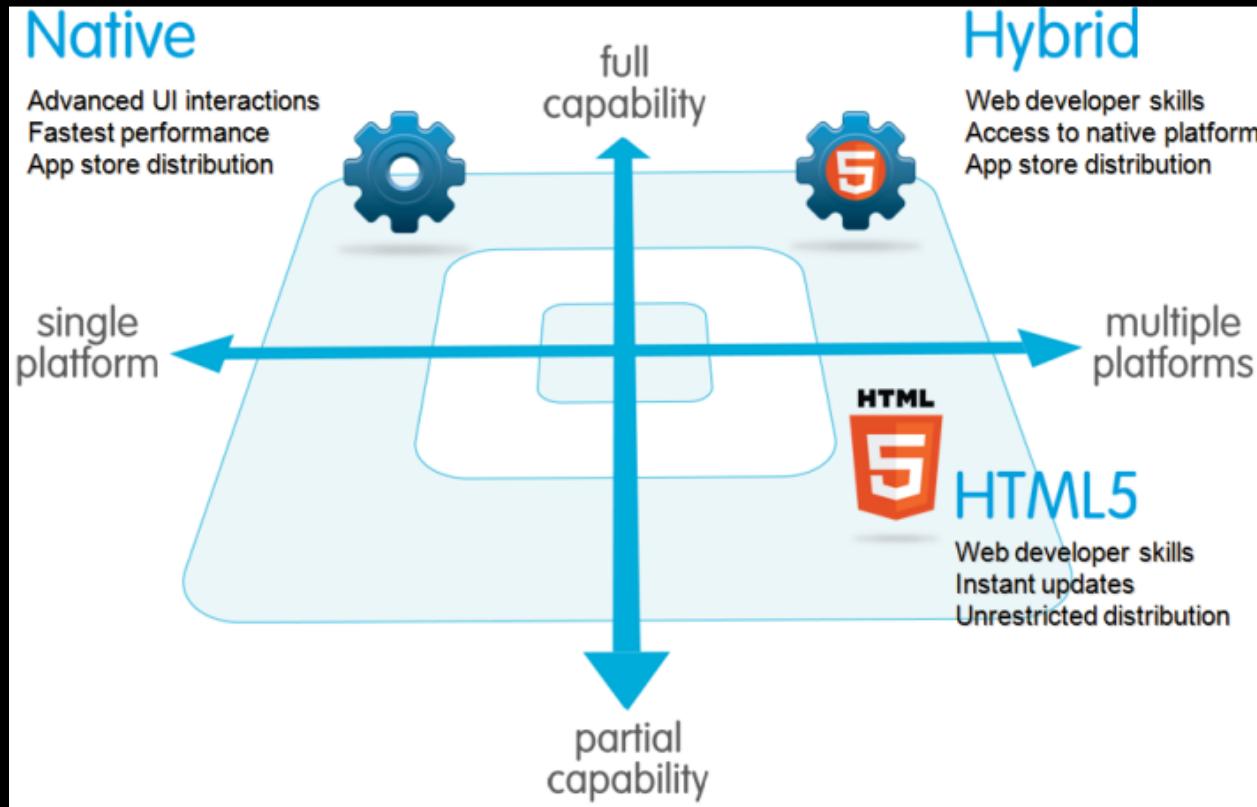
# ...decomposition by type



# There are three main types of mobile apps



# Landscape of types



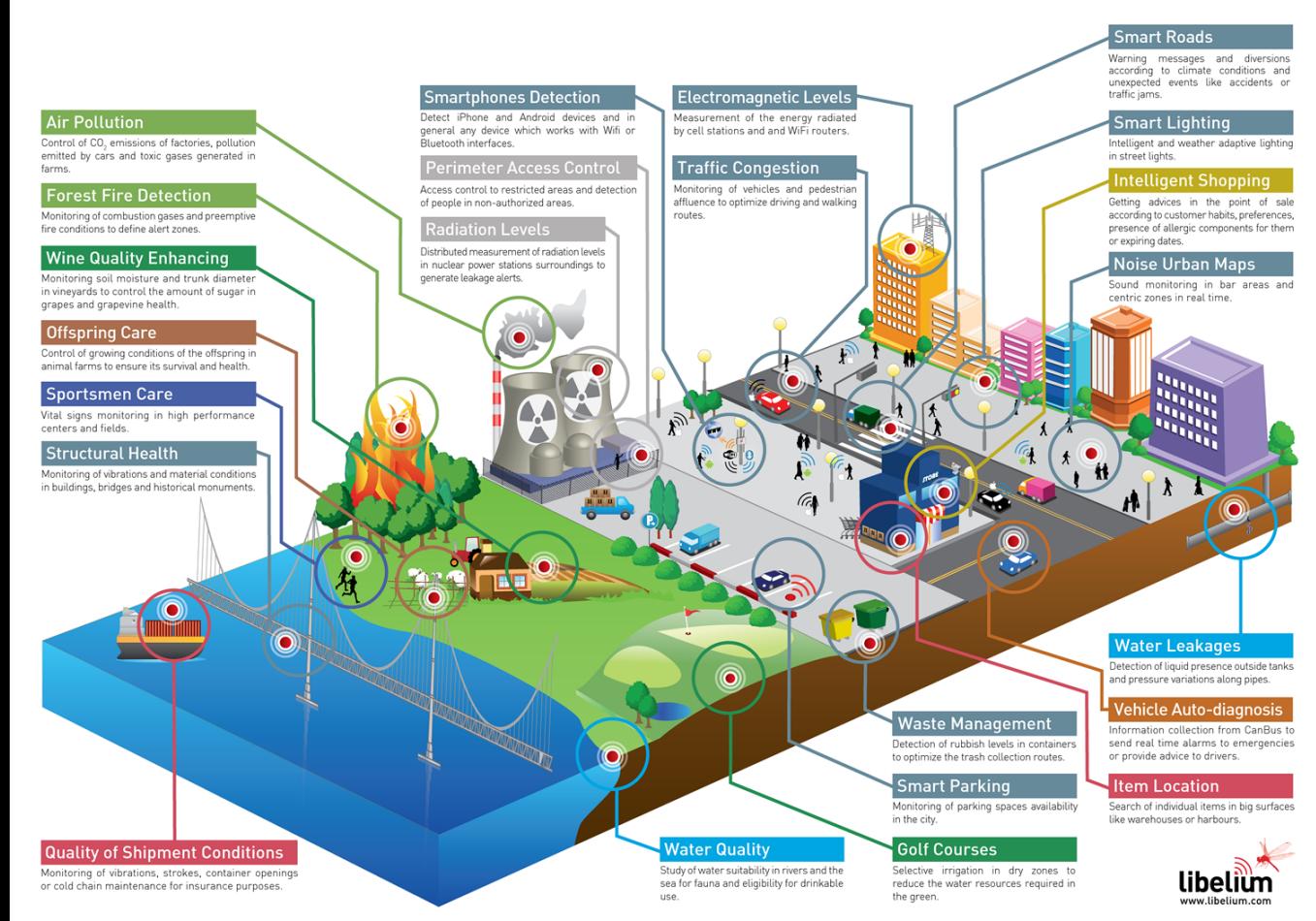
We will cover native and hybrid apps in this class.  
If you are interested in pure web apps, that was last  
semester.



What is the internet of things  
and  
why should you care?

# What is the internet of things?

# Sensors Embedded Everywhere



What is the internet of things?

fitbit  
surge™



GLASS

Including on your wrist, in your clothes, on your face...

NIKEFUEL



UP  
by JAWBONE™

What is the internet of things?

And lots of:



Face reality as it is, not as it was or as you wish it to be  
- Jack Welch (a favorite quote of mine obviously)

**Reality:** There are many security issues raised by a connected world  
(we will come back to these IoT topics)

For now...lets start with mobile apps  
Part2:

## More about Hybrid Apps

In this class, you're going to build several mobile apps.

Your first app will be a hybrid app that works with

*ember*

+



Later you'll create a native app  
and then you will come up with your own app idea  
that works with an IoT device  
(either native or hybrid)

# On to hybrid apps...



# On to hybrid apps...



## NATIVE CONTAINERS

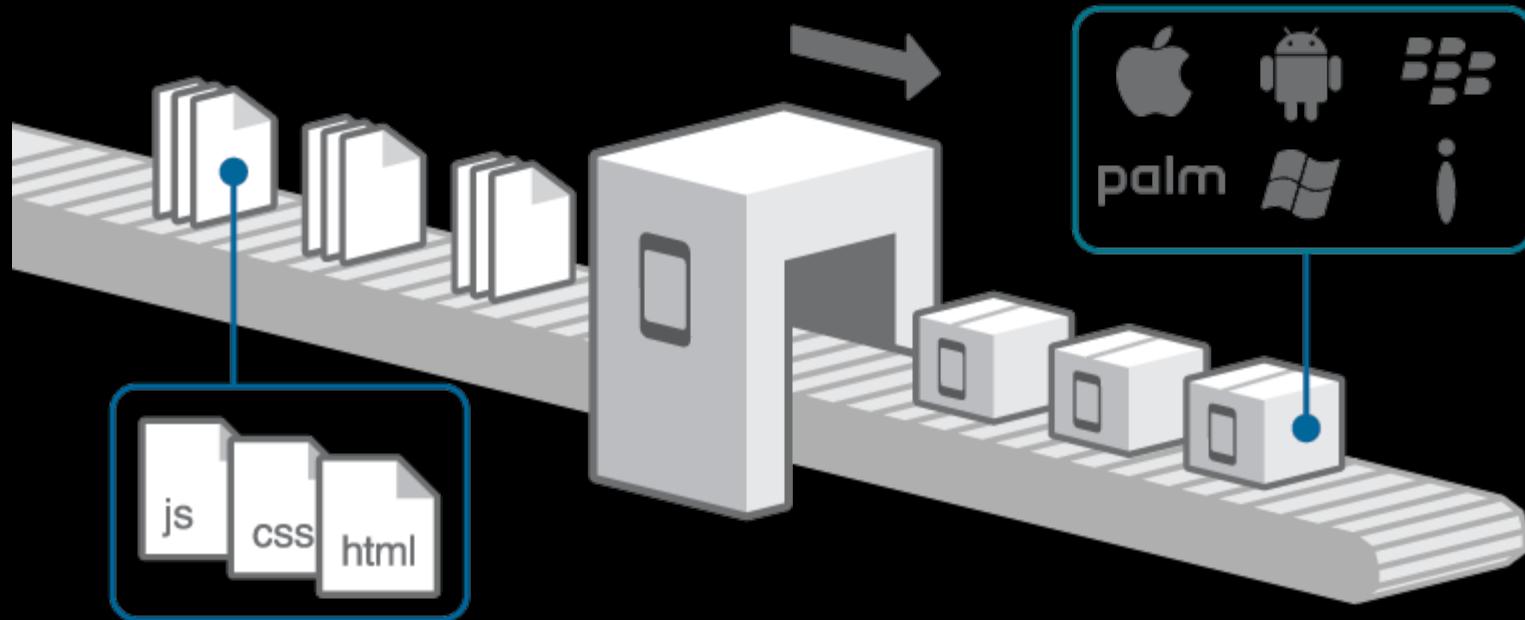


iOS - xCode/Objective-C  
Android - Eclipse/Java  
Windows - Visual Studio/C#

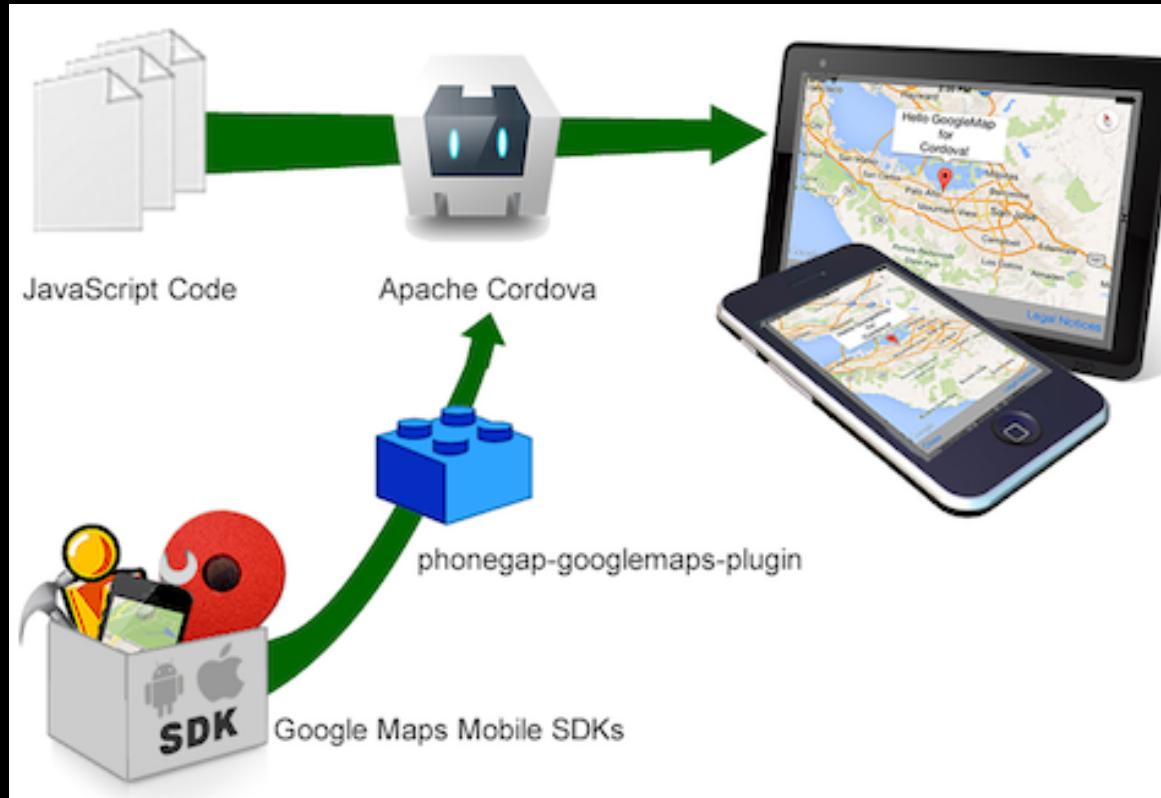
## MOBILE WEB



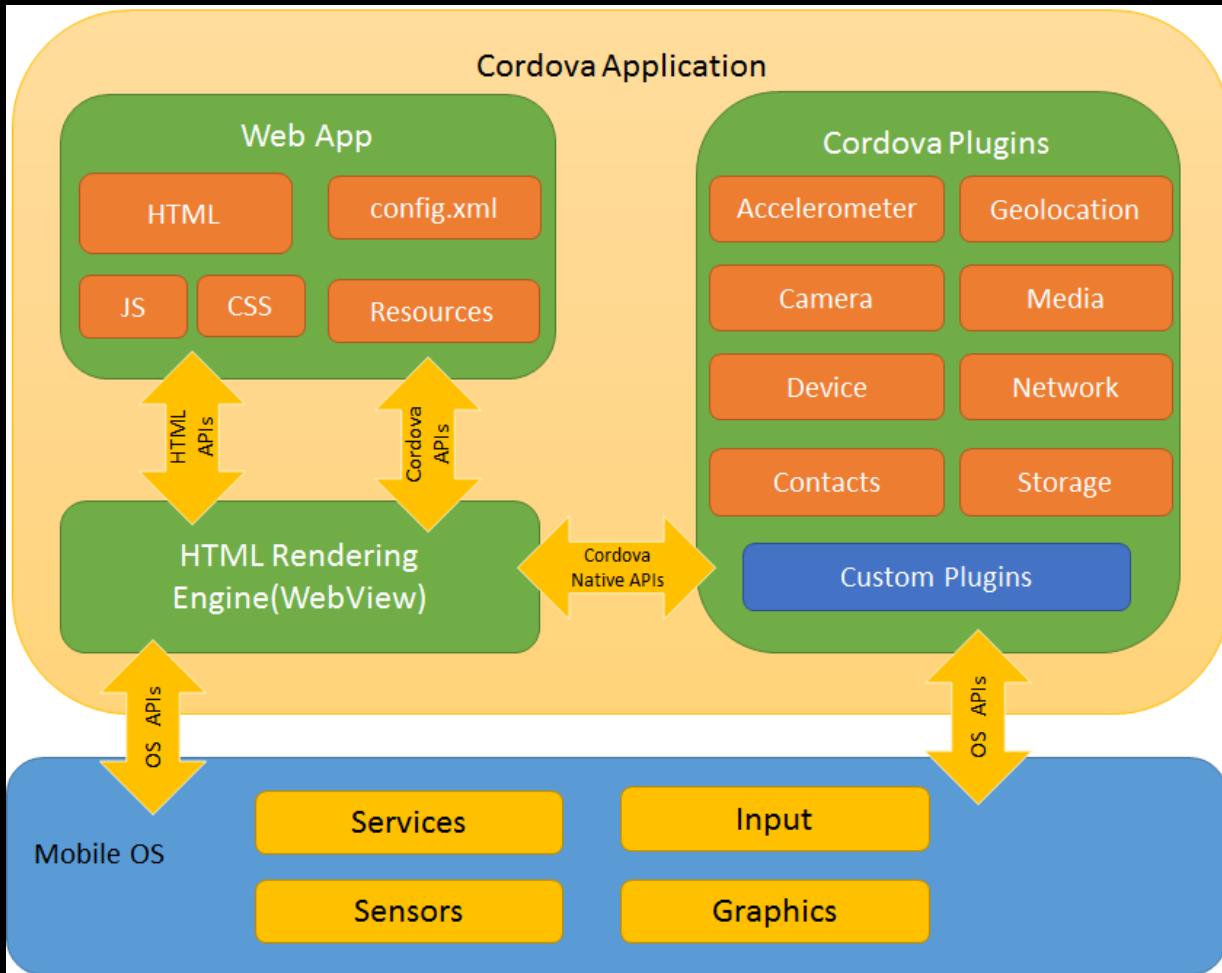
# Cordova Paradigm



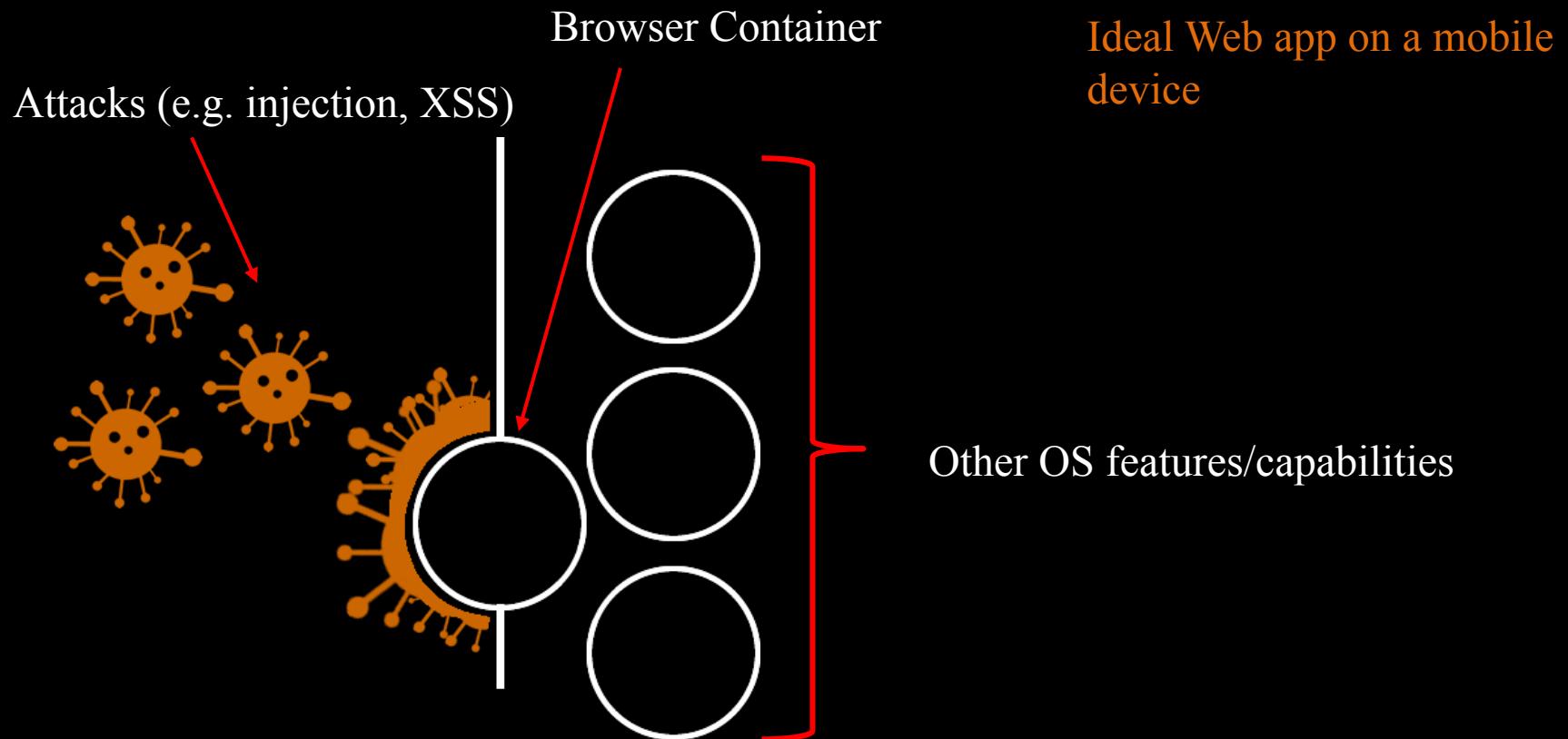
# Cordova Paradigm



# Cordova Architecture



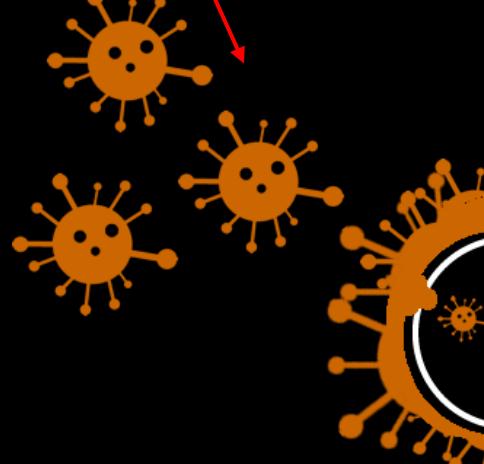
Hybrid apps have unique security challenges



## Browser Container

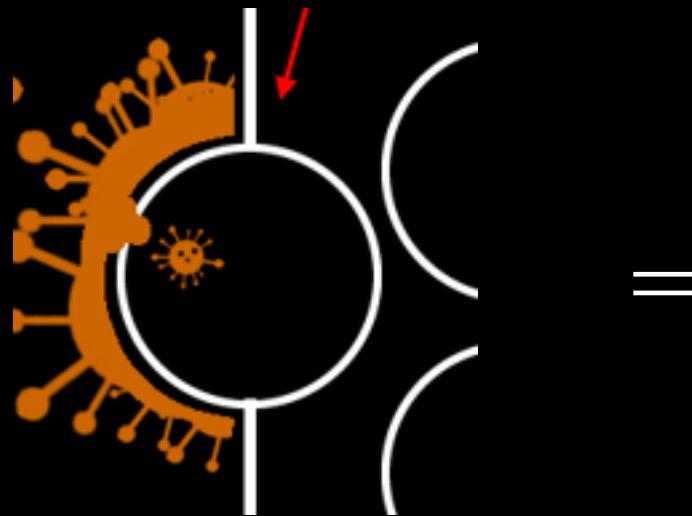
Vulnerable Web app

Attacks (e.g. injection, XSS)



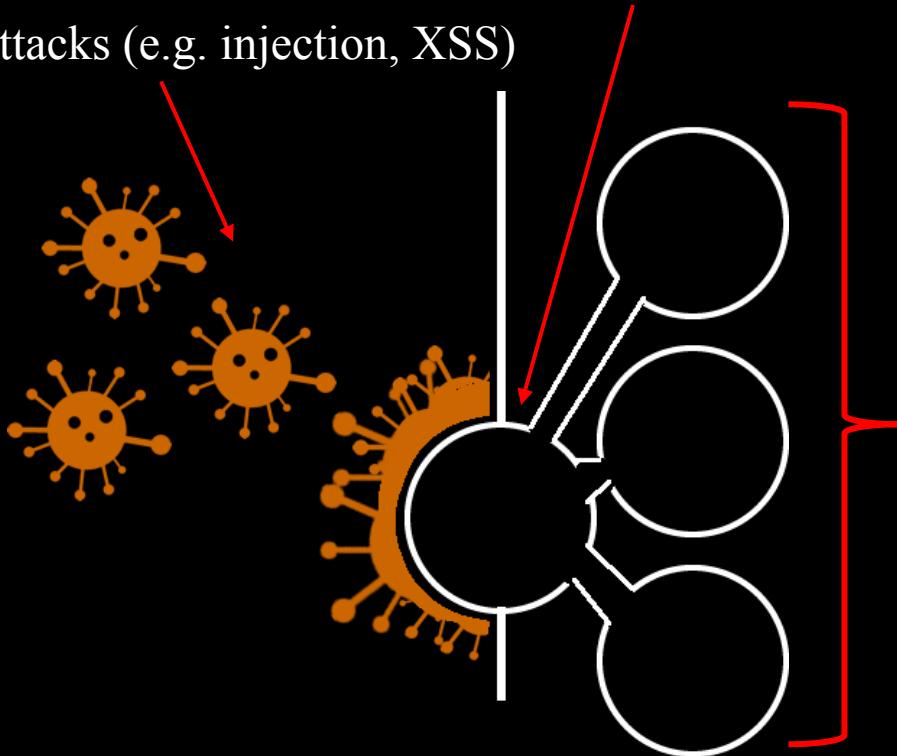
Other OS features/capabilities

At least it's a sandbox...



## Browser Container

Attacks (e.g. injection, XSS)



Ideal Hybrid app

Other client services now  
exposed by hybrid app

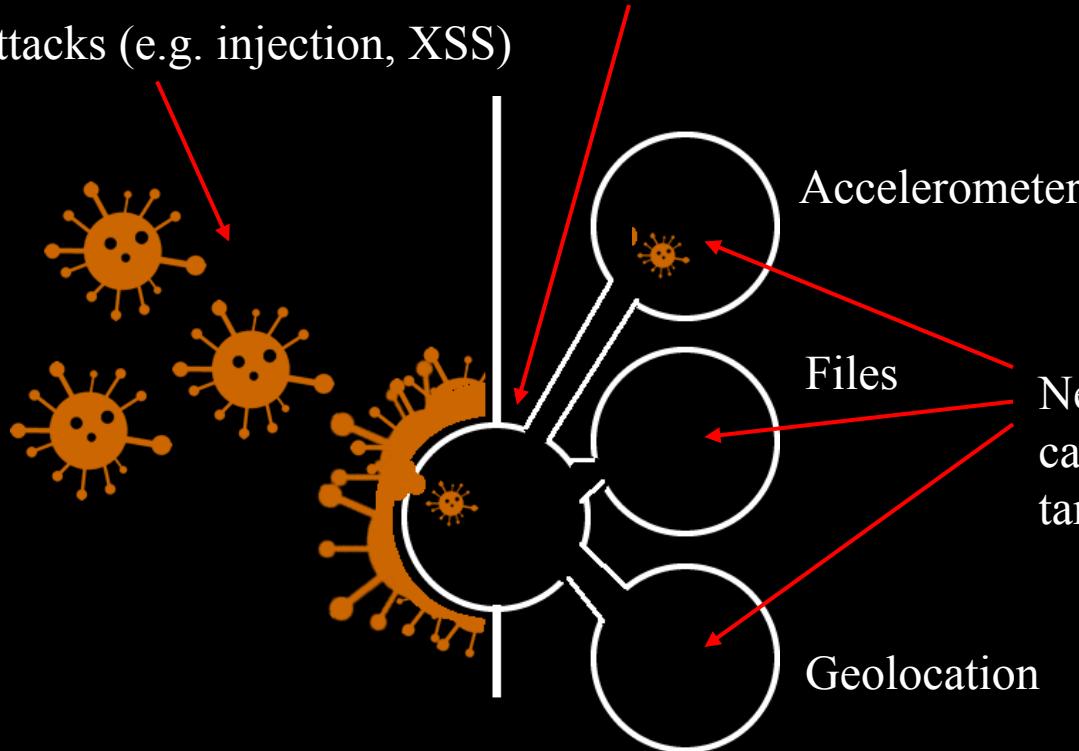
# Hybrid Reality



## Browser Container

## Vulnerable Hybrid app

Attacks (e.g. injection, XSS)



New attack surface. Web attacks can now act as *gateways* to larger targets.

Part 3: Get Started!  
Install Android, Cordova, Ember, and configure  
(goto: <https://github.com/MLHale/CYBR8480>)

ASK QUESTIONS!



# Questions?

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