# DEVOPS PATTERNS & ANTIPATTERNS FOR CONTINUOUS SOFTWARE UPDATES

## "What can possibly go wrong?!"

# WHY SOFTWARE UPDATES?

@jbaruch     #DevOpsWorld     #LiquidSoftware     http://jfrog.com/shownotes

Update time

Update time

Exploit A reported

Attack using exploit B

Exploit A patched

Exploit B patched

Vulnerability discovered

Exploit B discovered

Vulnerability patched

Attack using exploit A

Exploit B reported

Exploit A discovered

@jbaruch        #DevOpsWorld        #LiquidSoftware        http://jfrog.com/shownotes
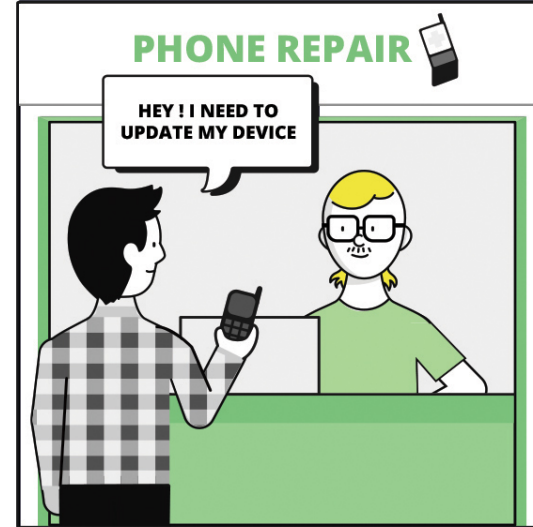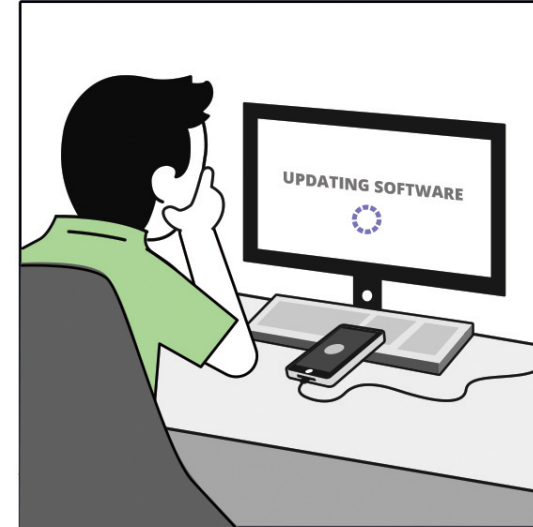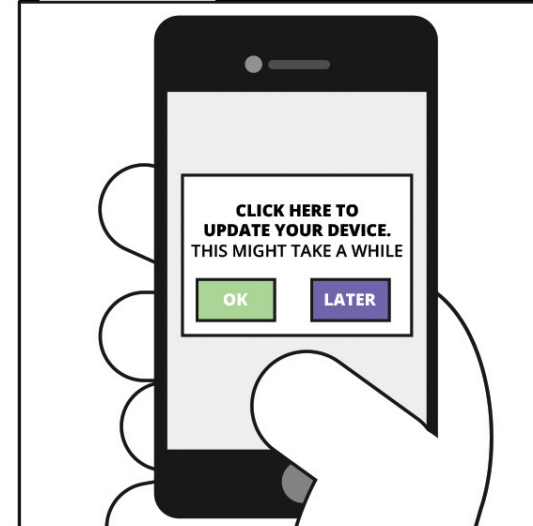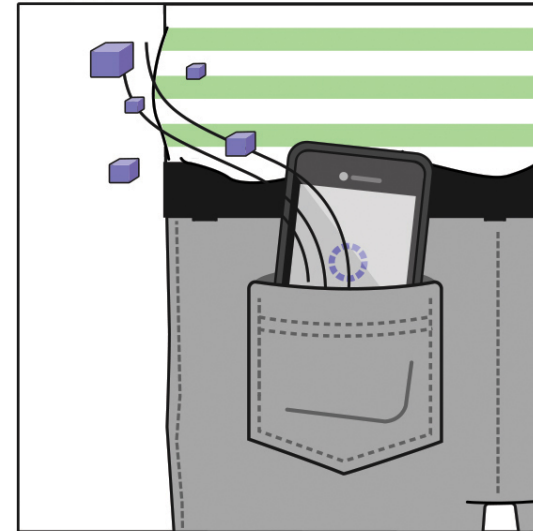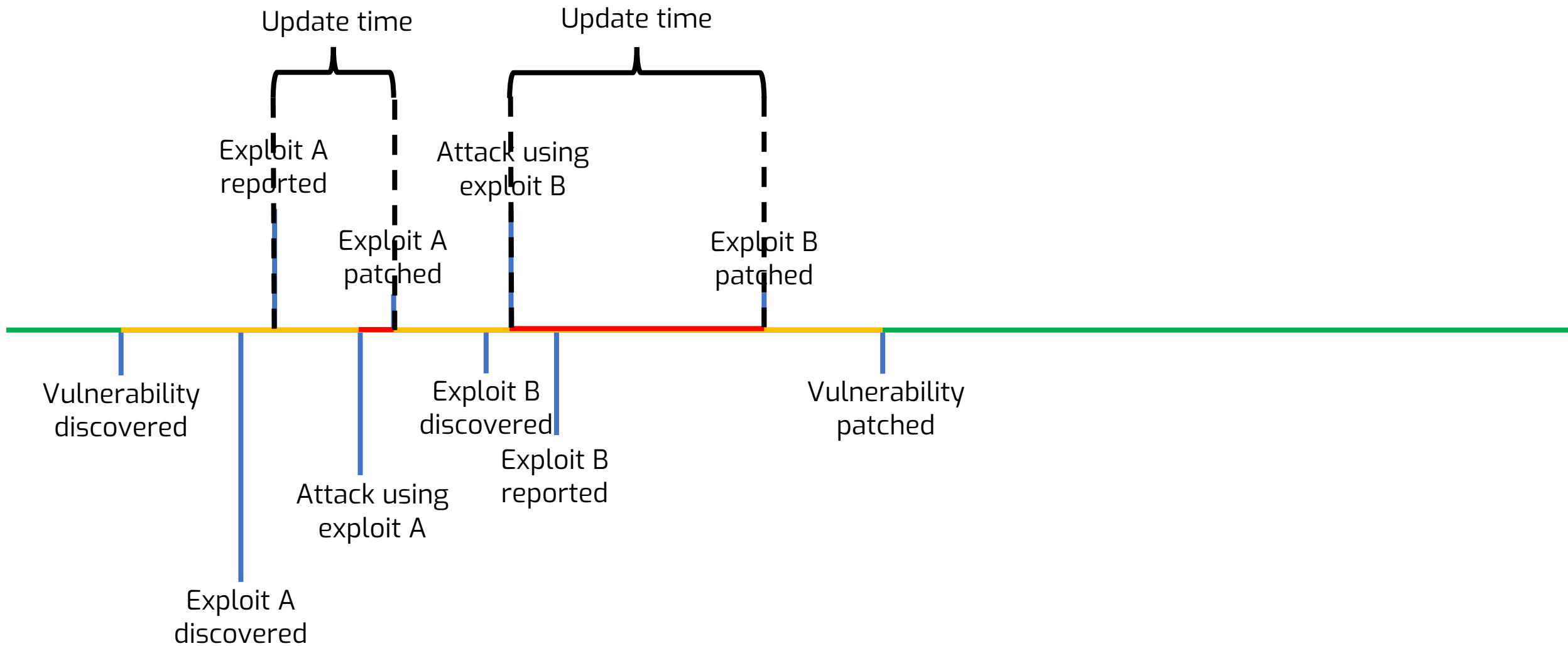
"AS EVERY COMPANY BECOME A SOFTWARE COMPANY,
SECURITY VULNERABILITIES ARE THE NEW OIL SPILLS"

Update time

Update time

Update time

Exploit A
reported

Attack using
exploit B

Attack using
exploit C

Exploit A
patched

Exploit B
patched

Exploit C
patched

Vulnerability
discovered

Exploit B
discovered

Exploit C
discovered

Exploit C
reported

Exploit A
discovered

Attack using
exploit A
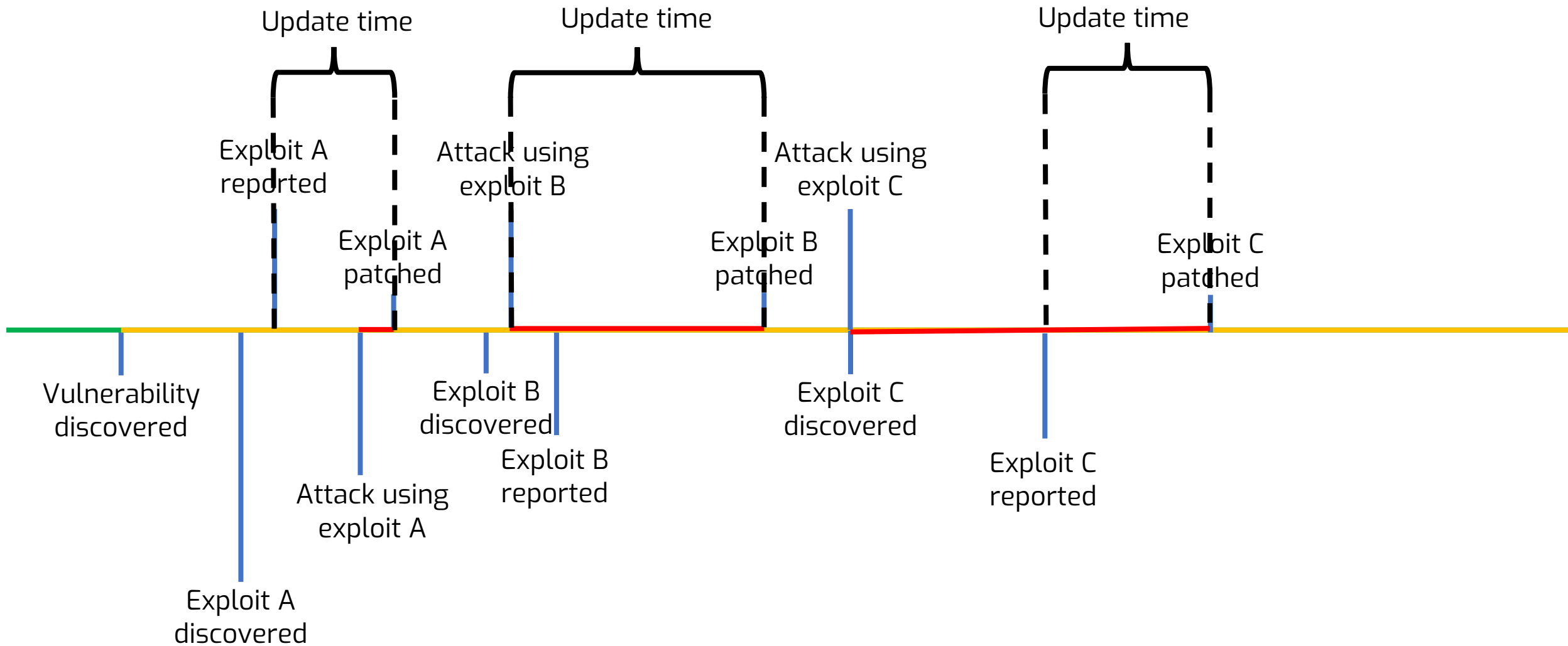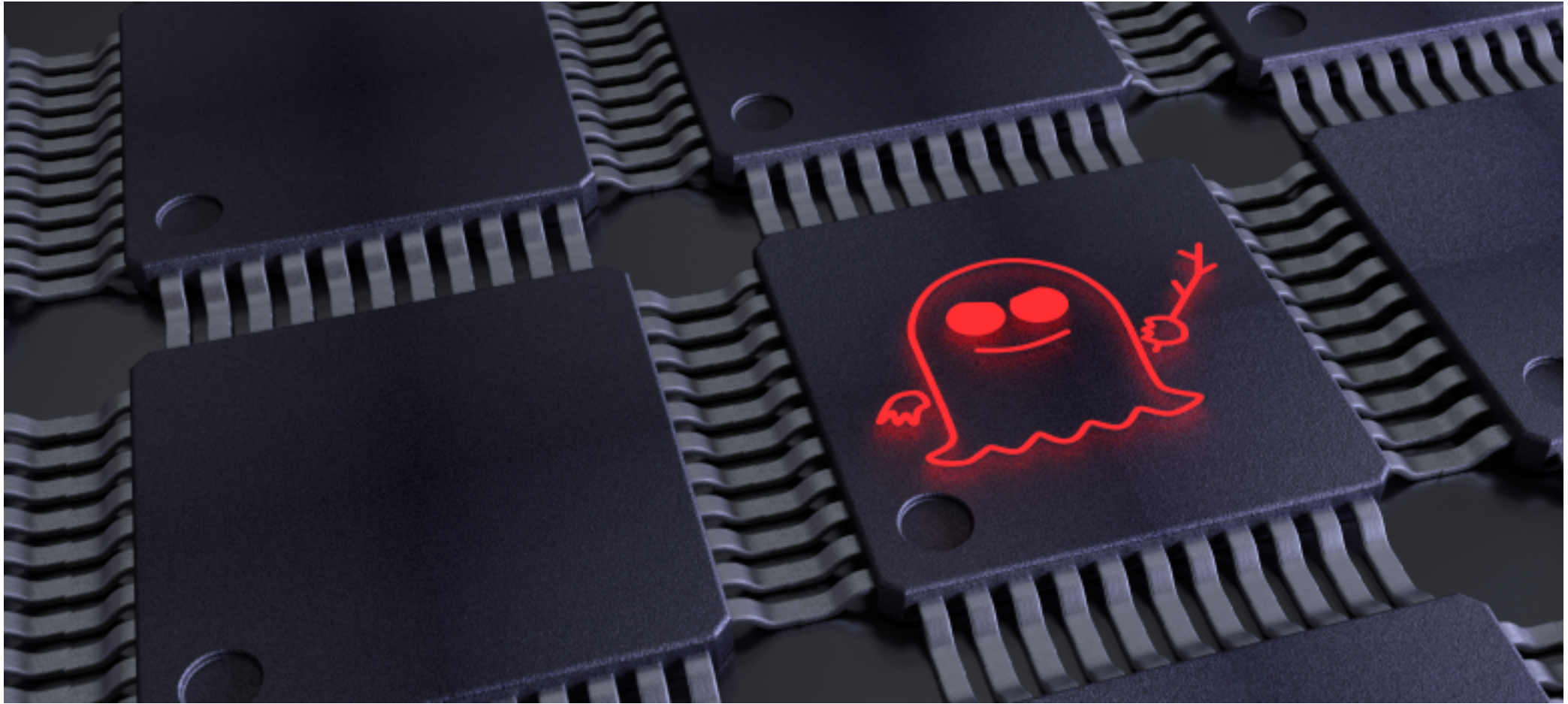
Exploit B
reported

# Chips may be inherently vulnerable to Spectre and Meltdown attacks

Most malware exploits coding errors and poor design. But Google security researchers say a fundamental flaw in the nature of computing could make <mark>some threats impossible to defeat.</mark>

by **Emerging Technology from the arXiv**                    Feb 25, 2019

*Accelerate:*
# State of DevOps

Strategies for a New Economy

**2018**
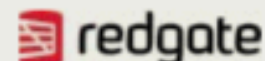
# WHO TOOK THE SURVEY?

Our research provides the most comprehensive view of the growing DevOps industry, with scientific studies that span five years and more than 30,000 survey responses. Nearly 1,900 professionals worldwide participated in this year's study, which reflects increasing diversity as measured by the proportion of women and underrepresented minorities, although the industry is still far from parity. This year we also report on respondents with disabilities for the first time.

# PERFORMANCE PROFILES

**7% ELITE**

**48%**
HIGH PERFORMERS

**37%**
MEDIUM PERFORMERS

**15%**
LOW PERFORMERS
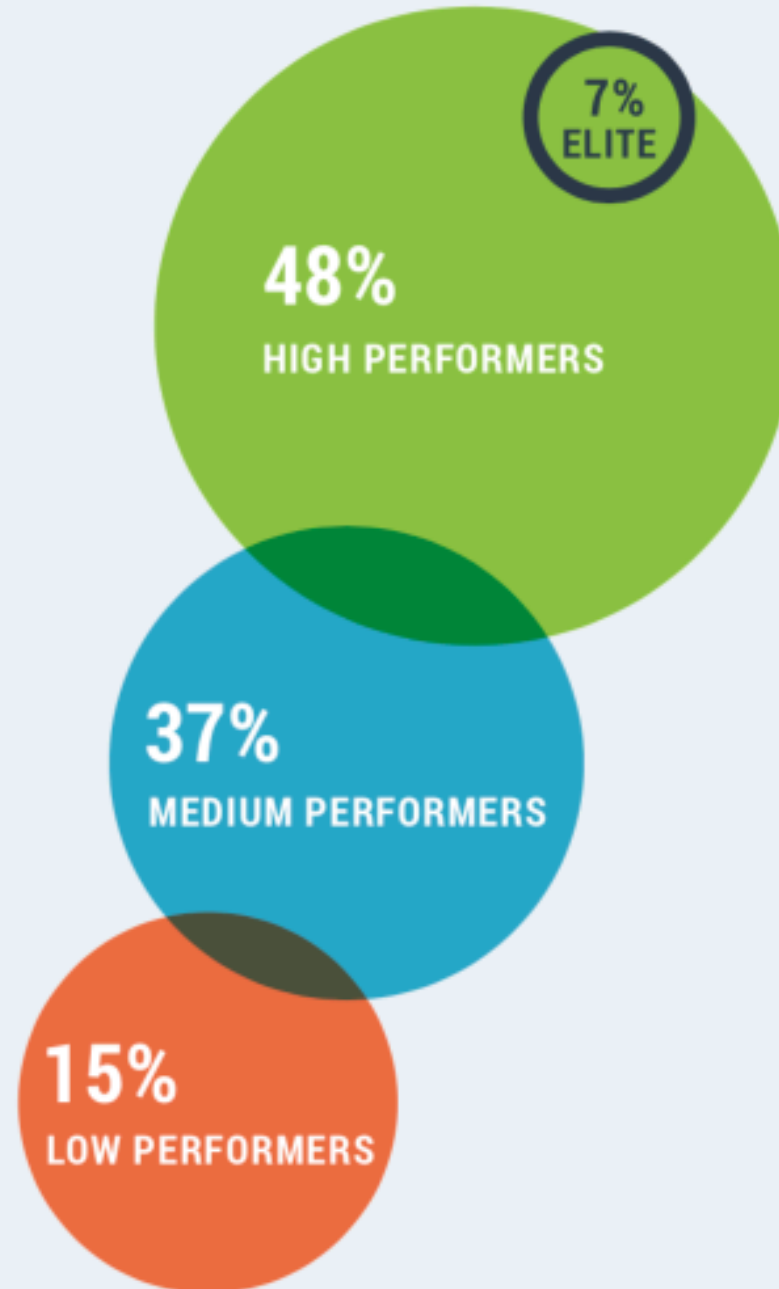
| Aspect of Software Delivery Performance | Elite[a] | |
| --- | --- | --- |
| **Deployment frequency**<br>For the primary application or service you work on, how often does your organization deploy code? | On-demand (multiple deploys per day) | |
| **Lead time for changes** | | |

# BARUCH SADOGURSKY

CHIEF STICKER OFFICER
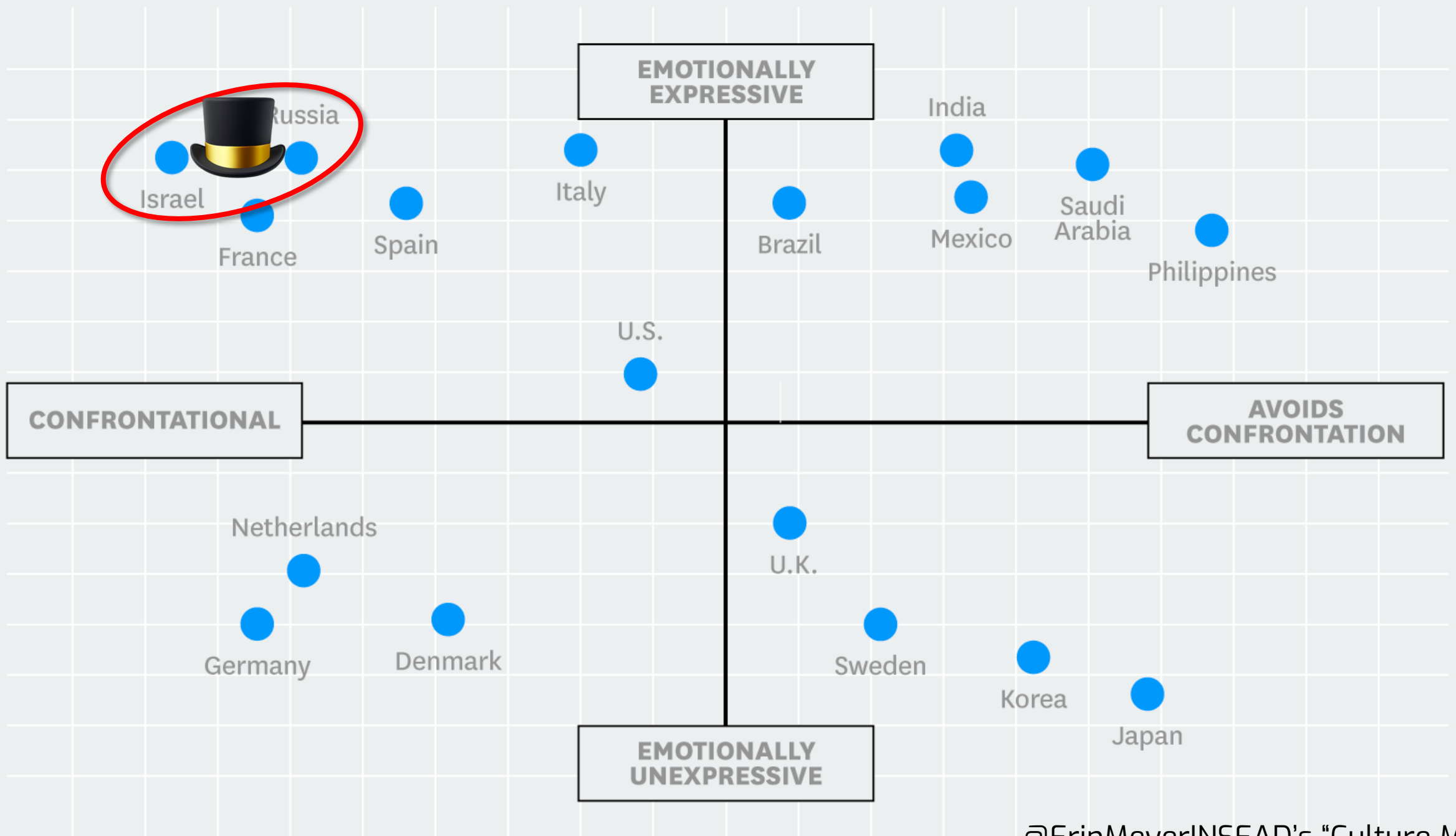
(ALSO 🎩 OF DEVELOPER ADVOCACY)

✉ JBARUCH@JFROG.COM

🐦 @JBARUCH

🎩 +1(408)890-9281

JFrog

EMOTIONALLY EXPRESSIVE

CONFRONTATIONAL

AVOIDS CONFRONTATION

EMOTIONALLY UNEXPRESSIVE

Israel

Russia

France

Spain

Italy

Brazil

India

Mexico

Saudi Arabia

Philippines

U.S.

Netherlands

Germany

Denmark

U.K.

Sweden

Korea

Japan

@ErinMeyerINSEAD's "Culture Map"

# SHOWNOTES

[ ] http://jfrog.com/shownotes

    [ ] Slides

    [ ] Video

    [ ] Links

    [ ] Comments, Ratings

    [ ] Raffle

# SO, YOU WANTED TO UPDATE FASTER...

*There's not a moment to lose!*

Mark Reinhold

**Moving Java Forward Faster**

2017/09/06 07:49:28 -07:00

# There's not a moment to lose!
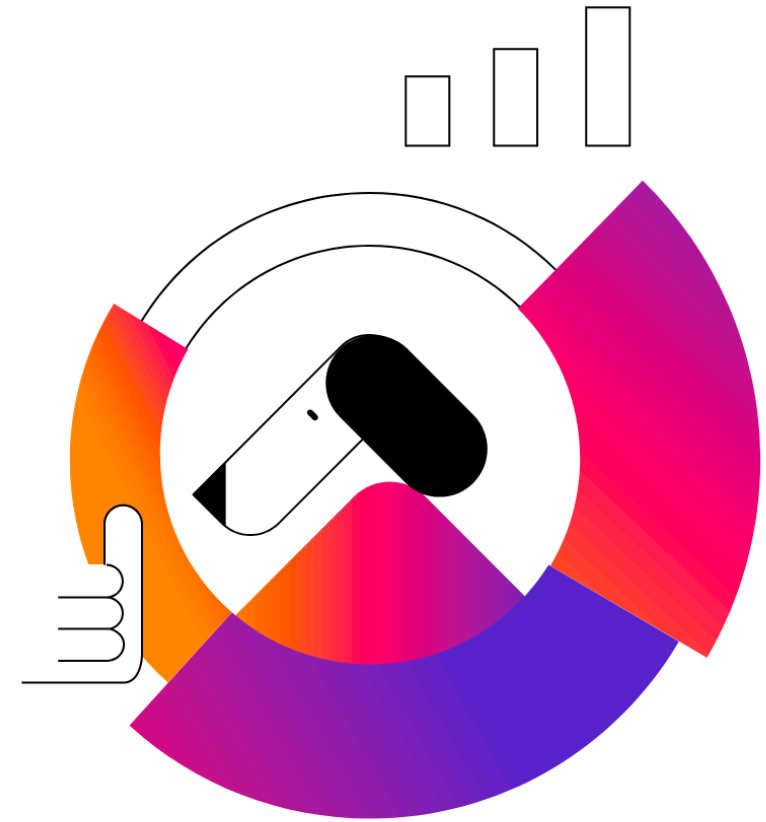
Mark Reinhold

## Moving Java Forward Faster

<mark>2017/09/06</mark> 07:49:28 -07:00

# The State of Developer Ecosystem 2019

In the beginning of 2019, we polled almost 7,000 developers to identify the State of Developer Ecosystem.
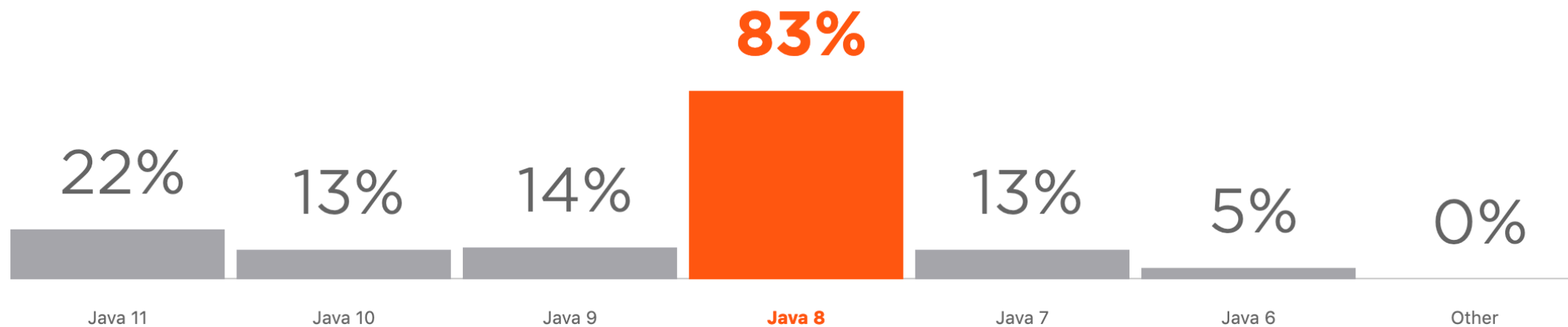
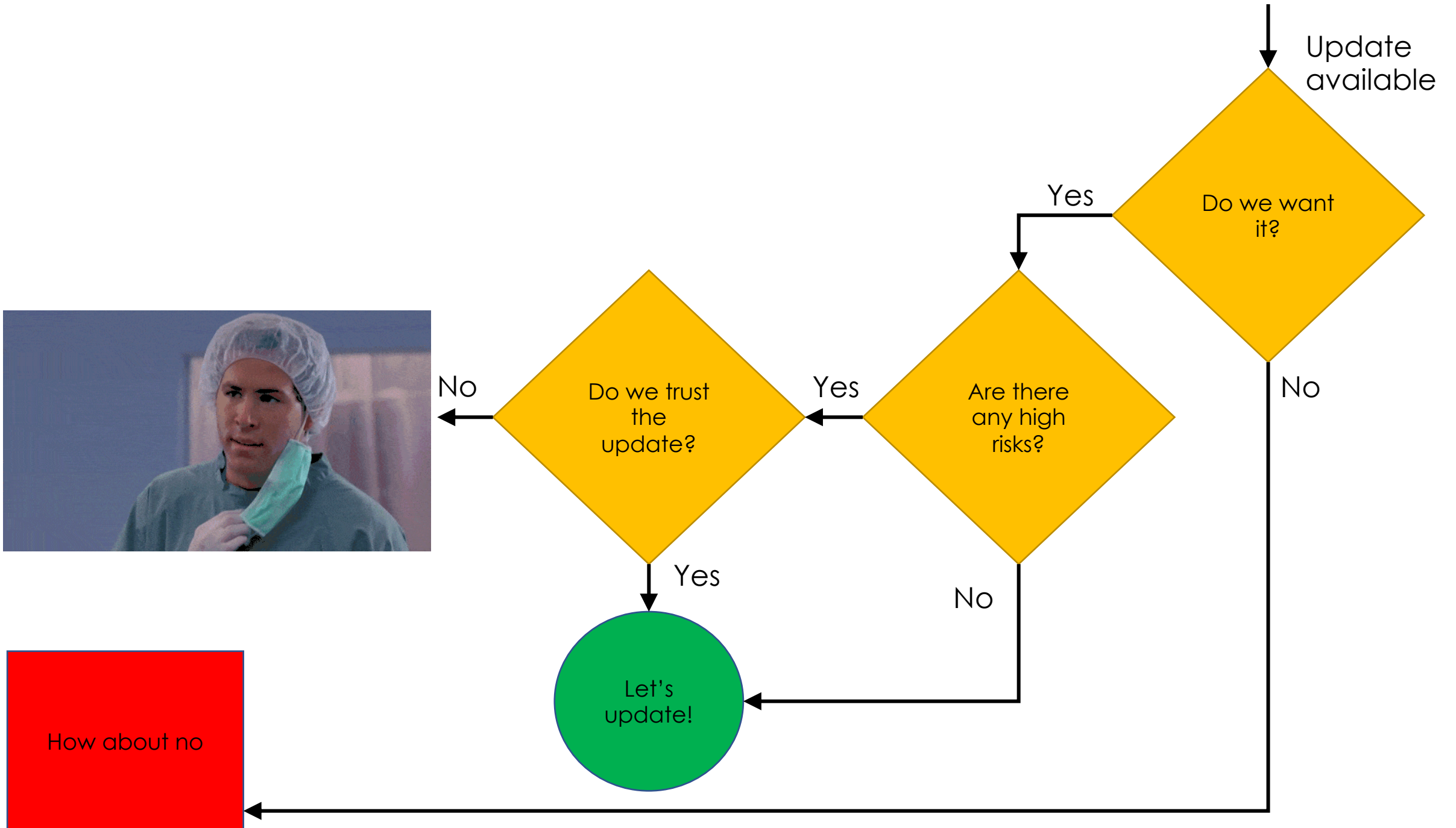Here's what we learned.



@jbaruch       #DevOpsWorld       #LiquidSoftware       http://jfrog.com/shownotes

**Which versions of Java do you regularly use?**



Although Java 10 and 11 have become more popular, Java 8 is still the most used version.

@jbaruch     #DevOpsWorld     #LiquidSoftware     http://jfrog.com/shownotes

Today

IoT

Serverless

Docker

Microservices

Infrastructure as Code

Continuous Delivery

Continuous Integration

Agile

2000

@jbaruch          @jfrog          #LiquidSoftware          www.liquidsoftware.com

#EMPTYENVELOPEFROMCHINA
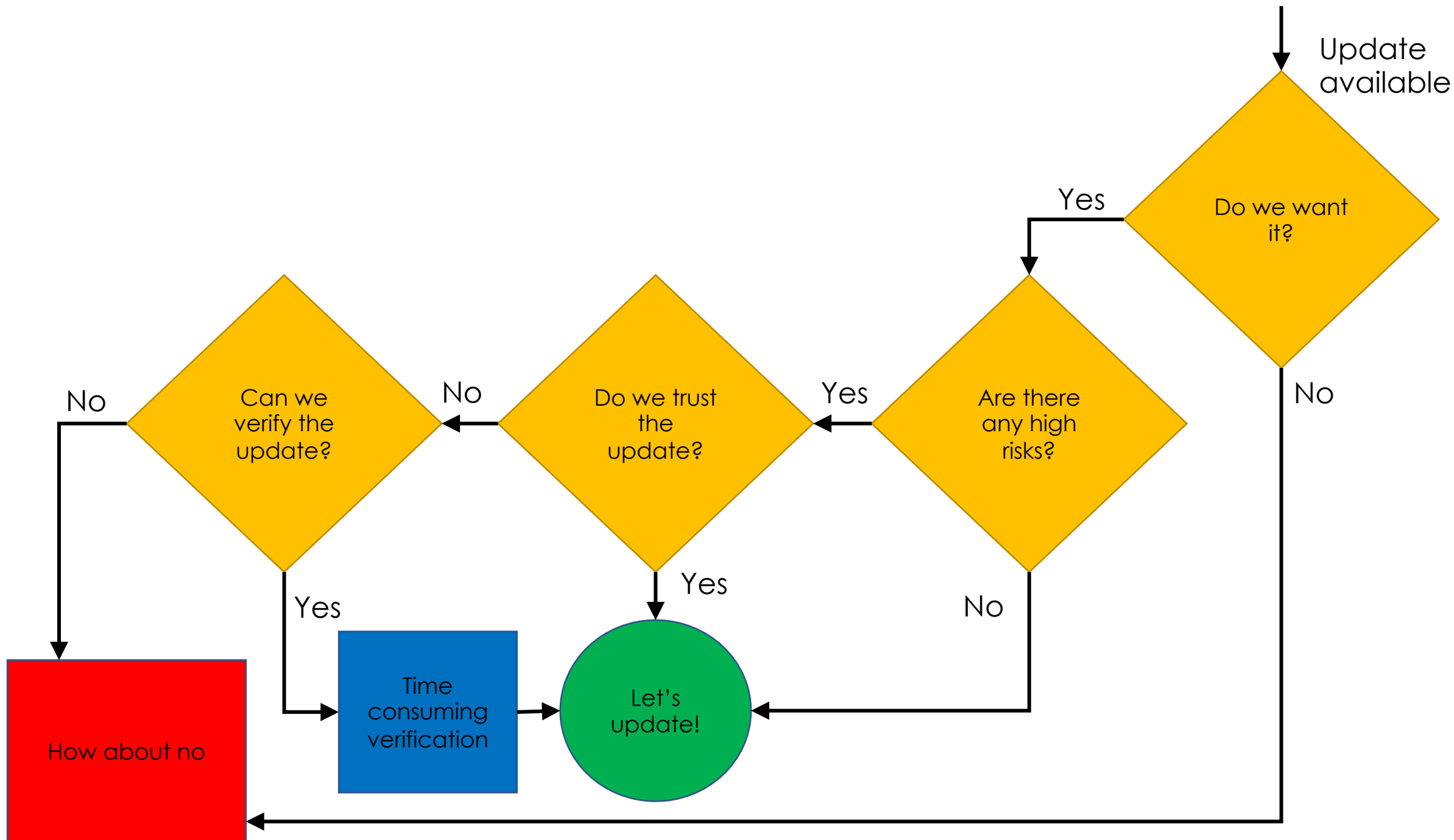
Features that we want

Acceptance tests costs

☐ Your browser
☐ Twitter in your browser
☐ Twitter on your smartphone
☐ Your smartphone OS?!

Update available

Do we want it?

Yes

No one asked you (auto update)

Are there any high risks?

No

Let's update!
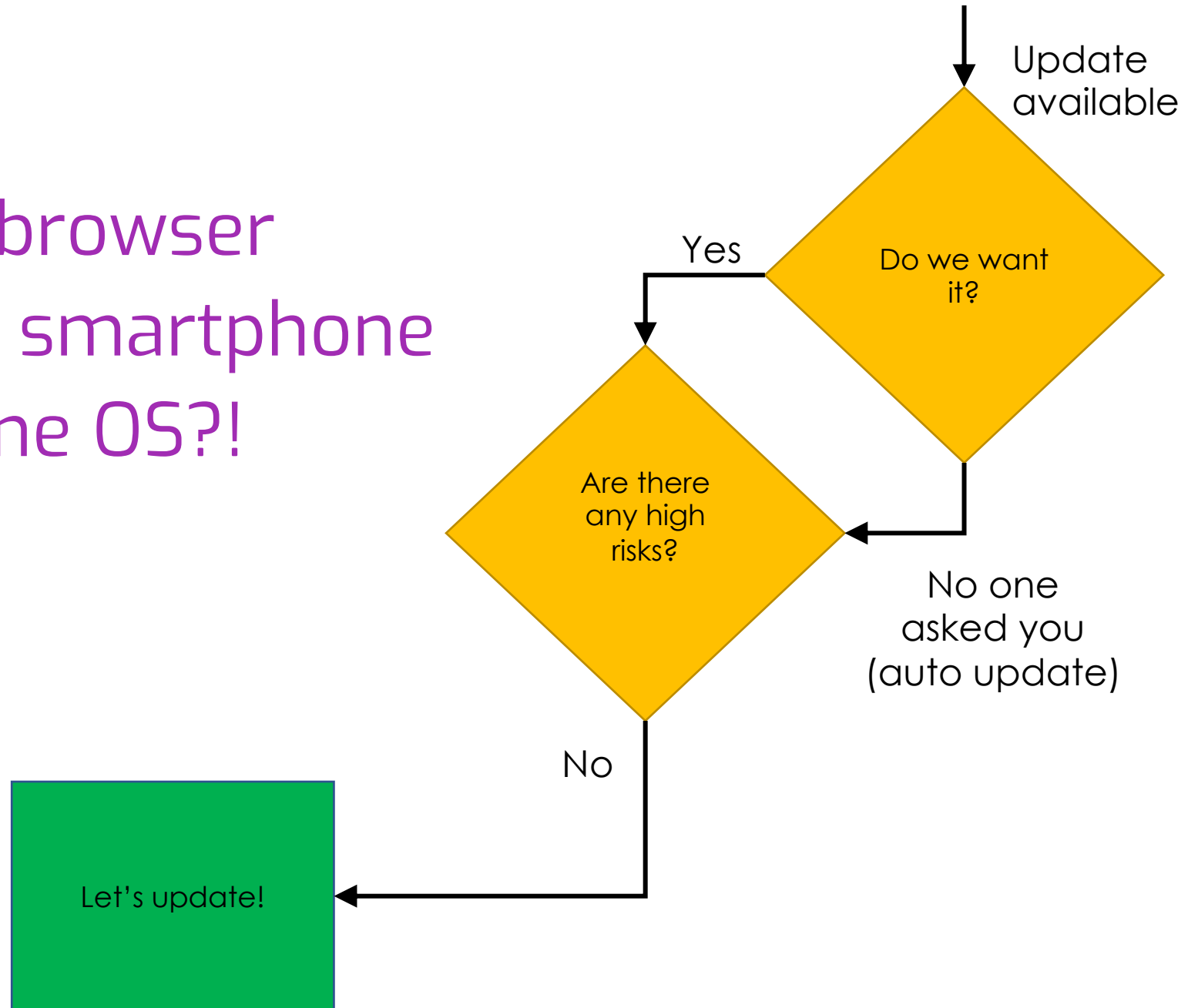
WHAT CAN POSSIBLY GO WRONG?
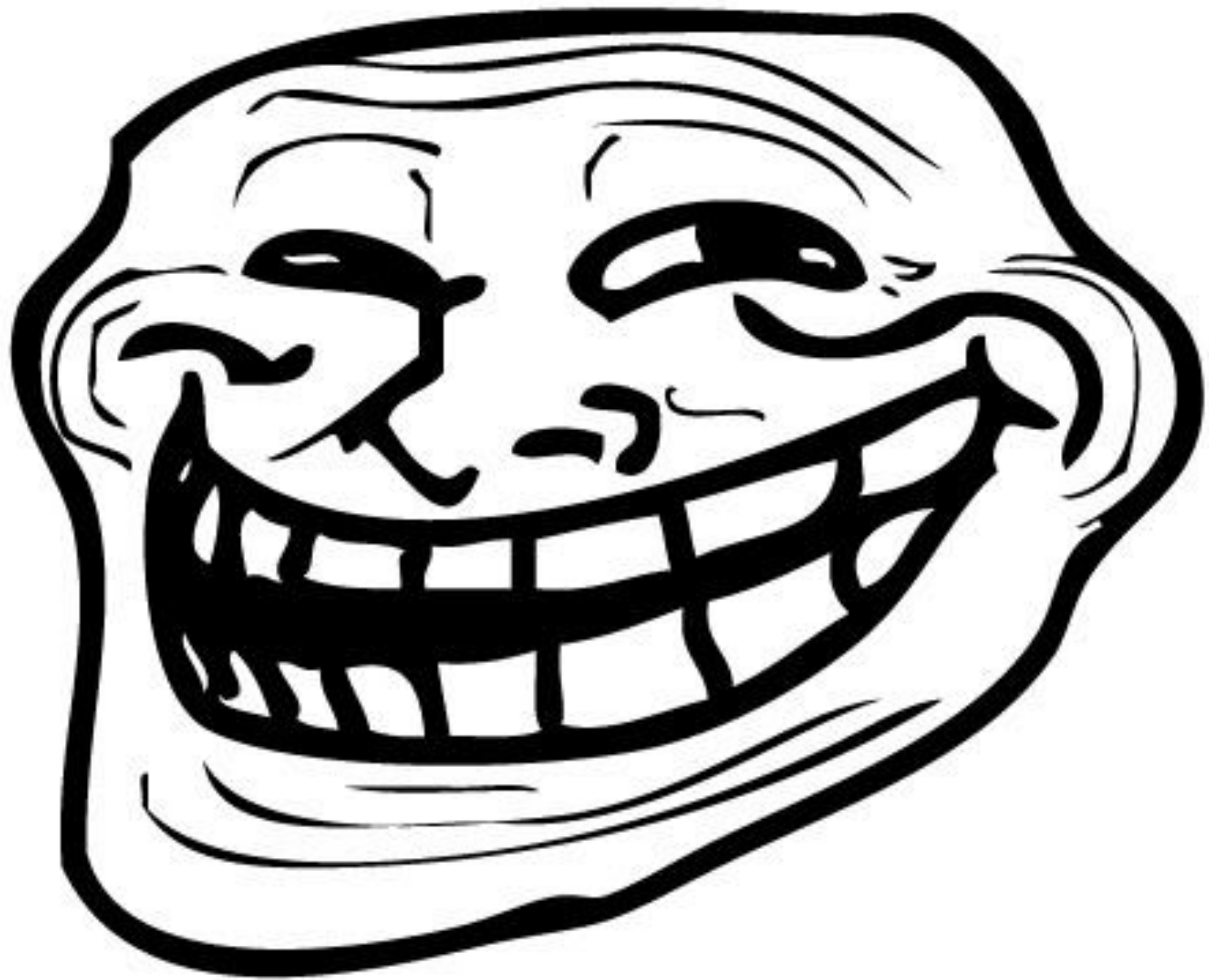
**OnHub**

FEATURES          APP          SUPPORT          BLOG

# A self-improving system.

From the moment you activate it, OnHub automatically starts learning and improving itself so you'll always have optimal Wi-Fi performance. Plus, it stays current with the latest changes in device software or security, making it compatible with new devices.

@jbaruch          #DevOpsWorld          #LiquidSoftware          http://jfrog.com/shownotes

# Google Wifi

## Sincerest Apologies for any Issues

Dear Google Wifi & OnHub customers,

Today we experienced an issue with our Google Accounts engine that may have affected your Google Wifi and OnHub devices. This caused some devices to automatically reset to the initial state you bought them in and they will unfortunately need to be set up again. This has not affected the software or performance of the device but it does need to be re-setup.

Visit this dedicated support page for more information and step-by-step instructions to get back online. If you set up your Wi-Fi with the same network name and password as before, your household connected devices should automatically reconnect.

If you do not want to set up the devices right now, you can always connect to the setup Wi-Fi network — the network name and password are printed on the base of your primary device (the one wired to the modem). This should get you connected to the internet immediately.

We know how important Wi-Fi is to you and share our sincerest apologies for the inconvenience this has caused.

Ben Brown On behalf of the Google Wifi and OnHub team

# CONTINUOUS UPDATES PATTERN:
## LOCAL ROLLBACK

▫ Problem: update went catastrophically wrong and an over the-air patch can't reach the device

▫ Solution: Have a previous version saved on the device prior to update. Rollback in case problem occurred
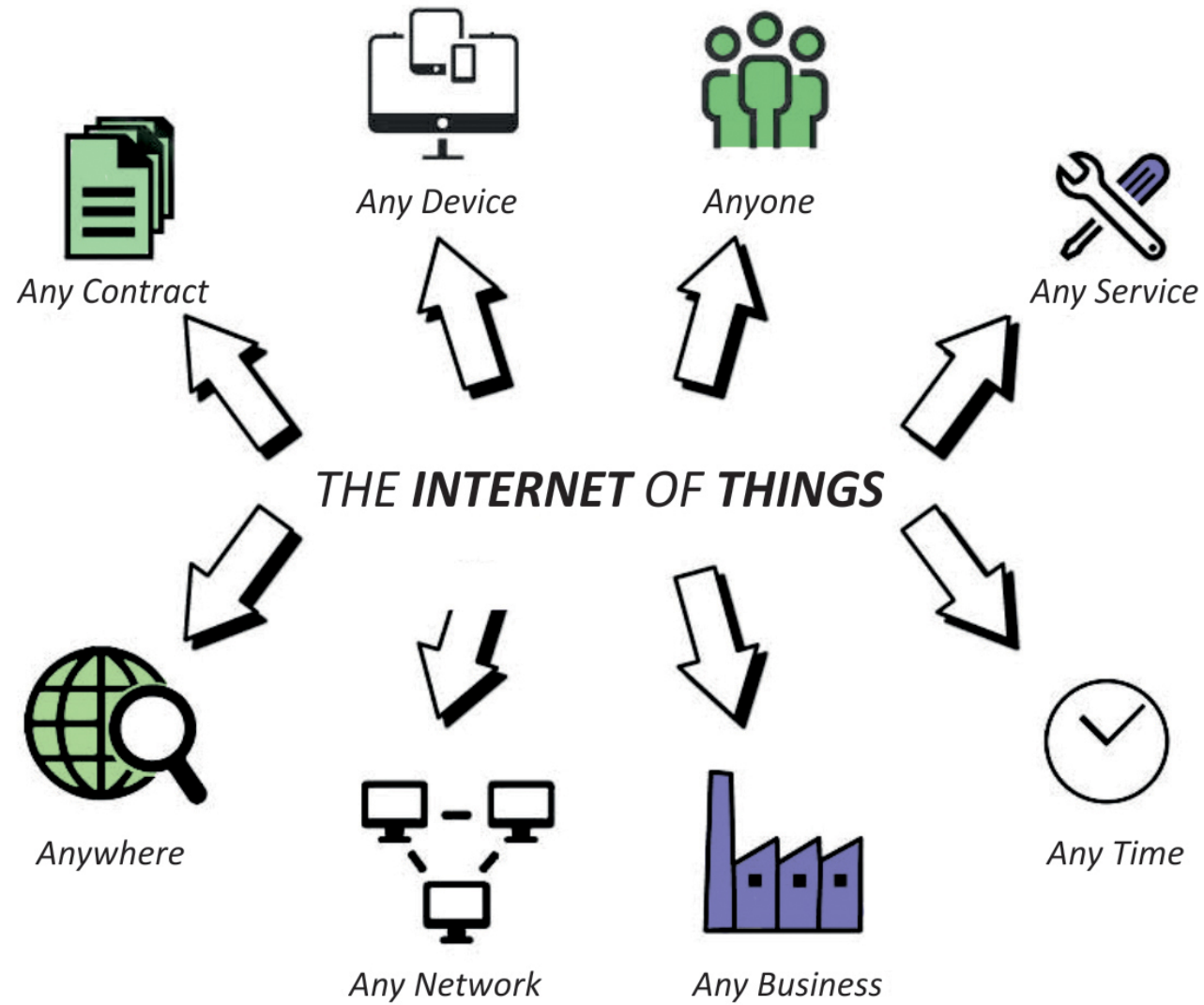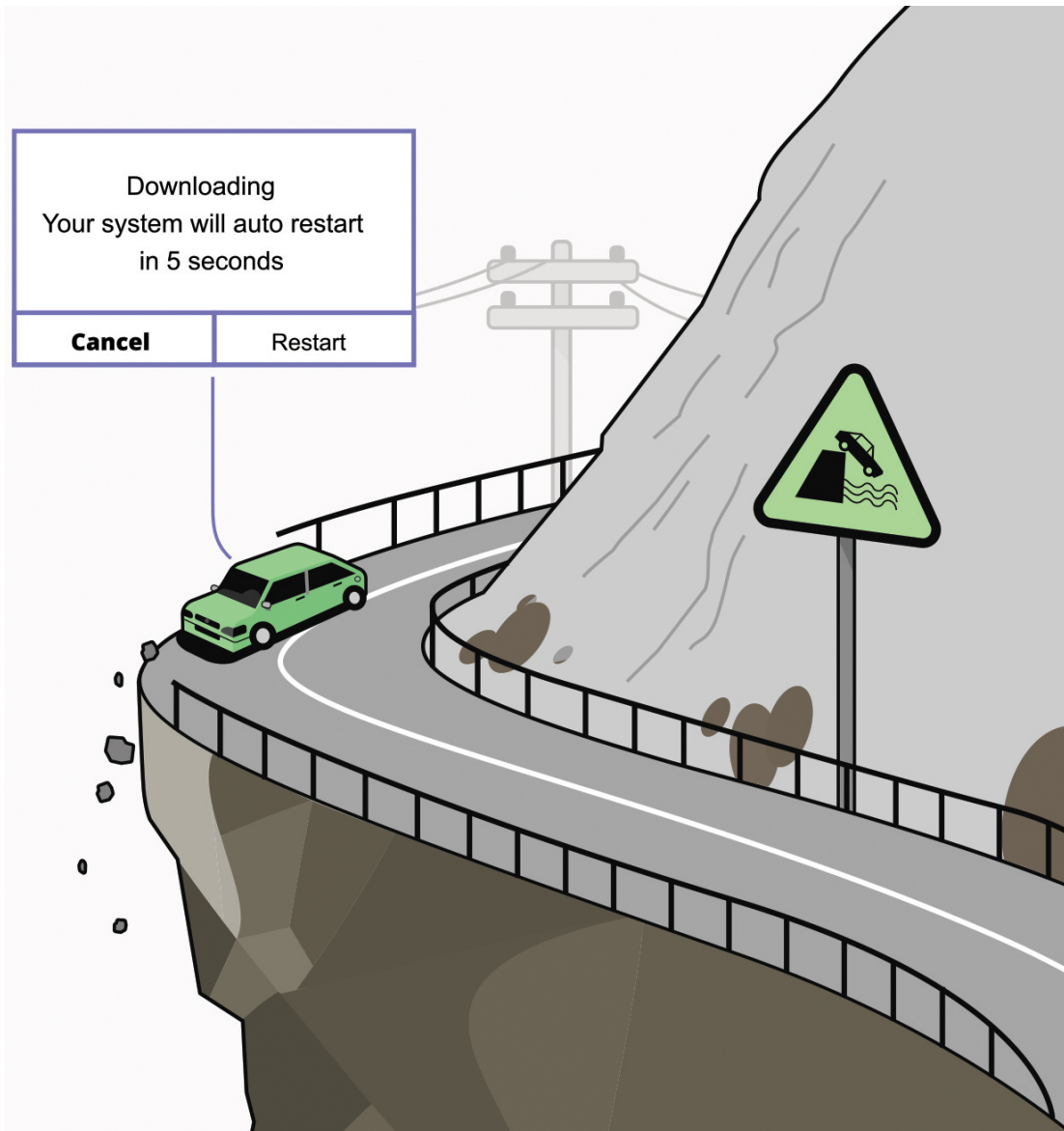
# Jaguar I-PACE Recalled, Needs Software Update To Fix Regenerative Brakes

By: **Mark Kane**

**Lack of over-the-air updates forces Jaguar to conduct an ordinary recall of the I-PACE to solve a software issue related to a regenerative brake system failure.**

# CONTINUOUS UPDATES PATTERN: OTA SOFTWARE UPDATES

⬚ Problem: physical recalls are costly. Extremely costly.

⬚ Solution: Implement over the air software updates, preferably, continuous updates.

# CONTINUOUS OTA UPDATES ARE LIKE NORMAL OTA UPDATES,
## BUT BETTER

## Sudden and erratic braking on autopilot | Tesla

https://forums.tesla.com/forum/forums/sudden-and-erratic-braking-autopilot ▾

Feb 27, 2019 - 51 posts - 34 authors

I have recently encountered a few incidents where my model x **suddenly brakes** while on **auto pilot** on the highway with no reason that I can ...

| | | |
|---|---|---|
| Car **suddenly** slamming on **brakes** while **auto pilot** | 43 posts | May 8, 2018 |
| Shadow Braking during **Autopilot** still an issue? | 51 posts | Mar 10, 2019 |
| **Autopilot** braking **suddenly** when no car present in front | 7 posts | Sep 12, 2018 |

Posted by u/dellfanboy ⬡ Owner Model 3 LR  4 months ago

∧

106

∨

## Phantom braking! Let's talk about it

`General`

So now that Navigate on Autopilot without input is being released, can we talk about phantom braking?

I'm on 2019.8.3 and the issue happened twice on a 2 hour drive. The first time, wasn't related to an overpass and the second was overpass related. Both times scared my passengers and I had to just turn it off for the rest of the ride.

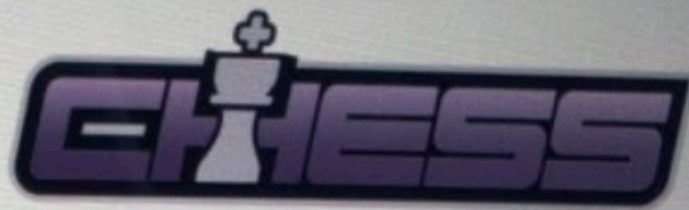Am I the only person who only uses autopilot driving solo due to phantom braking? Tesla needs to fix this ASAP.

💬 79 Comments   ⬟ Give Award   ↗ Share   🔖 Save   ⊘ Hide   🚩 Report

## Chess

Play Chess against your passenger or challenge four different levels of artificial intelligence. Move by dragging and dropping the chess piece during your turn.

As with all Tesla Arcade games, you can play when your car is in PARK by tapping the Application Launcher, then tap the Arcade icon and select your desired game from the menu.

## Media Volume Improvements

To make it easier to speak when dropping off or picking up passengers, music volume will be lowered when any door is opened.

This release contains minor improvements and bug fixes.

# CONTINUOUS UPDATES PATTERN:
# CONTINUOUS UPDATES

▢ Problem: In batch updates important features wait for non-important features.

▢ Solution: Implement continuous updates.

← My apps & games

UPDATES    INSTALLED    LIBRARY    BETA

No problems found
Apps scanned at 8:08 AM

Updates pending (33)
Auto-update is turned on

UPDATE ALL

# Nubs' Adventure

**IMakeGames**

Adventure
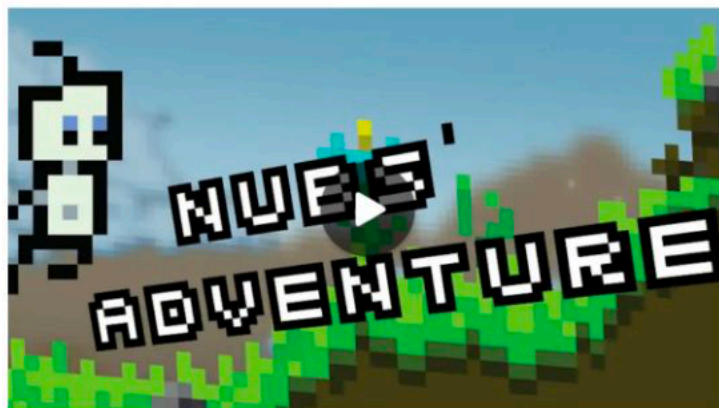
INSTALL

In-app purchases

4.2 ★
7K reviews

100K+
Downloads

Everyone 10+ ⓘ

Nubs' Adventure - Exploratory Platformer

READ MORE

## Ratings and reviews

ⓘ

4.2

★★★★⯪

7,314

5
4
3
2
1

# NUB'S HORROR

- New feature update
- Uses templating with $ symbol
- Apple's staging servers return prices without $ symbol
- **Some** Apple's production servers return prices with $ symbol
- As a result, some users suffer crashes
- It took time to understand what went wrong
- It took time to get the fix through Apple review

# CONTINUOUS UPDATES PATTERN:
## CANARY RELEASES

⬡ Problem: Releasing a bug affects ALL the users.

⬡ Solution: Release to a small number of users first and observe.
If a problem occurs, stop the release, revert or update the affected users.

# CONTINUOUS UPDATES PATTERN: OBSERVABILITY

- Problem: Some problems are hard to trace relying on user feedback only

- Solution: Implement tracing, monitoring and logging

# CONTINUOUS UPDATES PATTERN:
## ROLLBACKS

⬚ Problem: Fixes might take time, users suffer in a meanwhile

⬚ Solution: Implement rollback, the ability to deploy a previous version without delay

# CONTINUOUS UPDATES PATTERN:
## FEATURE FLAGS

⬚ Problem: Rollbacks are not always supported by the deployment target platform

⬚ Solution: Embed 2 versions of the features in the app itself and trigger them with API calls

# YOU THOUGHT YOUR PROBLEMS ARE HARD?

| THINGS UNDER YOUR CONTROL | SERVER-SIDE UPDATES | IOT (MOBILE, AUTOMOTIVE, EDGE) UPDATES |
| --- | --- | --- |

# YOU THOUGHT YOUR PROBLEMS ARE HARD?

| THINGS UNDER YOUR CONTROL | SERVER-SIDE UPDATES | IOT (MOBILE, AUTOMOTIVE, EDGE) UPDATES |
|---|---|---|
| The availability of the target | ✓ | ✗ |

# YOU THOUGHT YOUR PROBLEMS ARE HARD?

| THINGS UNDER YOUR CONTROL | SERVER-SIDE UPDATES | IOT (MOBILE, AUTOMOTIVE, EDGE) UPDATES |
|---|:---:|:---:|
| The availability of the target | ✓ | ✗ |
| The state of the target | ✓ | ✗ |

# YOU THOUGHT YOUR PROBLEMS ARE HARD?

| THINGS UNDER YOUR CONTROL | SERVER-SIDE UPDATES | IOT (MOBILE, AUTOMOTIVE, EDGE) UPDATES |
|---|:---:|:---:|
| The availability of the target | ✓ | ✗ |
| The state of the target | ✓ | ✗ |
| The version on the target | ✓ | ✗ |

# YOU THOUGHT YOUR PROBLEMS ARE HARD?

| THINGS UNDER YOUR CONTROL | SERVER-SIDE UPDATES | IOT (MOBILE, AUTOMOTIVE, EDGE) UPDATES |
|---|:---:|:---:|
| The availability of the target | ✓ | ✗ |
| The state of the target | ✓ | ✗ |
| The version on the target | ✓ | ✗ |
| The access to the target | ✓ | ✗ |

@jbaruch     #DevOpsWorld     #LiquidSoftware     http://jfrog.com/shownotes

**Software**

# How one bad algorithm cost traders $440m

## A look at the worst software testing day ever

By Dan Olds, OrionX 3 Aug 2012 at 09:32          118 💬          SHARE ▼



Knight Capital, a firm that specialises in executing trades for retail brokers, took $440m in cash losses Wednesday due to a faulty test of new trading software. This morning reports were calling it a trading "glitch", which isn't nearly as accurate as the term I'd use: "f**king disaster".

# KNIGHT-MARE

- New system reused old APIs
- 1 out of 8 servers was not updated
- New clients sent requests to machine contained old code
- Engineers undeployed working code from updated servers, increasing the load on the not-updated server
- No monitoring, no alerting, no debugging

# CONTINUOUS UPDATES PATTERN:
## AUTOMATED DEPLOYMENT

- Problem: People suck at repetitive tasks.
- Solution: Automate everything.

# CONTINUOUS UPDATES PATTERN:
# FREQUENT UPDATES

**Problem:** Seldom deployments generate anxiety and stress, leading to errors.

**Solution:** Update frequently to develop skill and habit.

# CONTINUOUS UPDATES PATTERN:
## STATE AWARENESS

◻ Problem: Target state can affect the update process and the behavior of the system after the update.

◻ Solution: Know and consider target state when updating.
Reverting might require revering the state.

**Matthew Prince** 🌤️ ✓
@eastdakota

The teams at @verizon and @noction should be incredibly embarrassed at their failings this morning which impacted @Cloudflare and other large chunks of the Internet. It's absurd BGP is so fragile. It's more absurd Verizon would blindly accept routes without basic filters.

11:42 AM · Jun 24, 2019 · Echofon

**Data Centre** ▸ **Cloud**

# Cloudflare gave everyone a 30-minute break from a chunk of the internet yesterday: Here's how they did it

## DevOps-tating automation cockup... or machines trying to take over the web? *El Reg* talks to the CTO

By Richard Speed 3 Jul 2019 at 12:17          43 💬          **SHARE ▼**

**Interview** Internet services outfit Cloudflare took careful aim and unloaded both barrels at its feet yesterday, taking out a large chunk of the internet as it did so.

In an impressive act of openness, the company posted a distressingly detailed post-mortem on the cockwomblery that led to the outage. *The Register* also spoke to a weary John Graham-Cumming, CTO of the embattled company, to understand how it all went down.

This time it wasn't Verizon wot dunnit; Cloudflare engineered this outage all by itself.

# REAL LIFE PATTERN:
## BE KIND

- Problem: You shame someone publicly; week later shit happens to you.
- Solution: Don't be a shmuck.

**CLOUD-DARK**

- New rules are deployed frequently to battle attacks
- Deployment of a single misconfigured rule
- Included regex to spike CPU to 100%
- "Affected region: Earth"

# CONTINUOUS UPDATES PATTERN:
## CANARY RELEASES

⬚ Problem: Releasing a bug affects ALL the users.

⬚ Solution: Release to a small number of users first and observe.
If a problem occurs, stop the release, revert or update the affected users.

# Stain Removal Guide

- Always test to be sure that a stain removal product will not damage fabric by applying to a small part of the fabric that is not easily seen.

# MoviePass has shut down for 'several weeks' to update its app

21 💬

*'There's never a good time to have to do this'*

By Jon Porter | @JonPorty | Jul 5, 2019, 12:04pm EDT
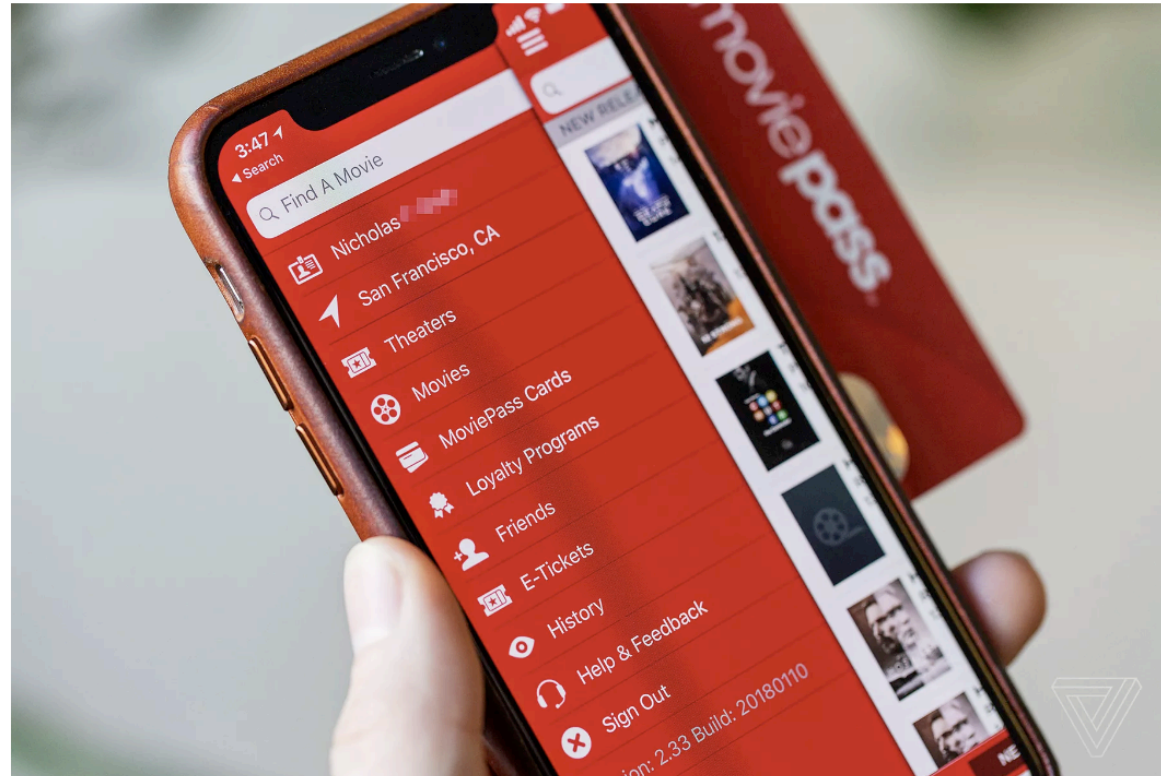


Photo by Vjeran Pavic / The Verge

MoviePass, the long-embattled film subscription service, has shut down for "several weeks" in order to complete work on an updated version of its app and to recapitalize for when the service relaunches. "There's never a good time to have to do this," MoviePass CEO Mitch Lowe said in a statement, "but to complete the improved version of our app, one that we believe will provide a much better experience for our subscribers, it has to be done." Lowe's statement promised "an enhanced technology platform, which is in the final stages of completion," in the upcoming app.

# CONTINUOUS UPDATES PATTERN:
## ZERO DOWNTIME UPDATES

⬚ Problem: You will probably loose all your users if you shut down for 5 weeks (and counting) to perform an update.

⬚ Solution: Perform zero-downtime OTA small and fequent continuous updates.

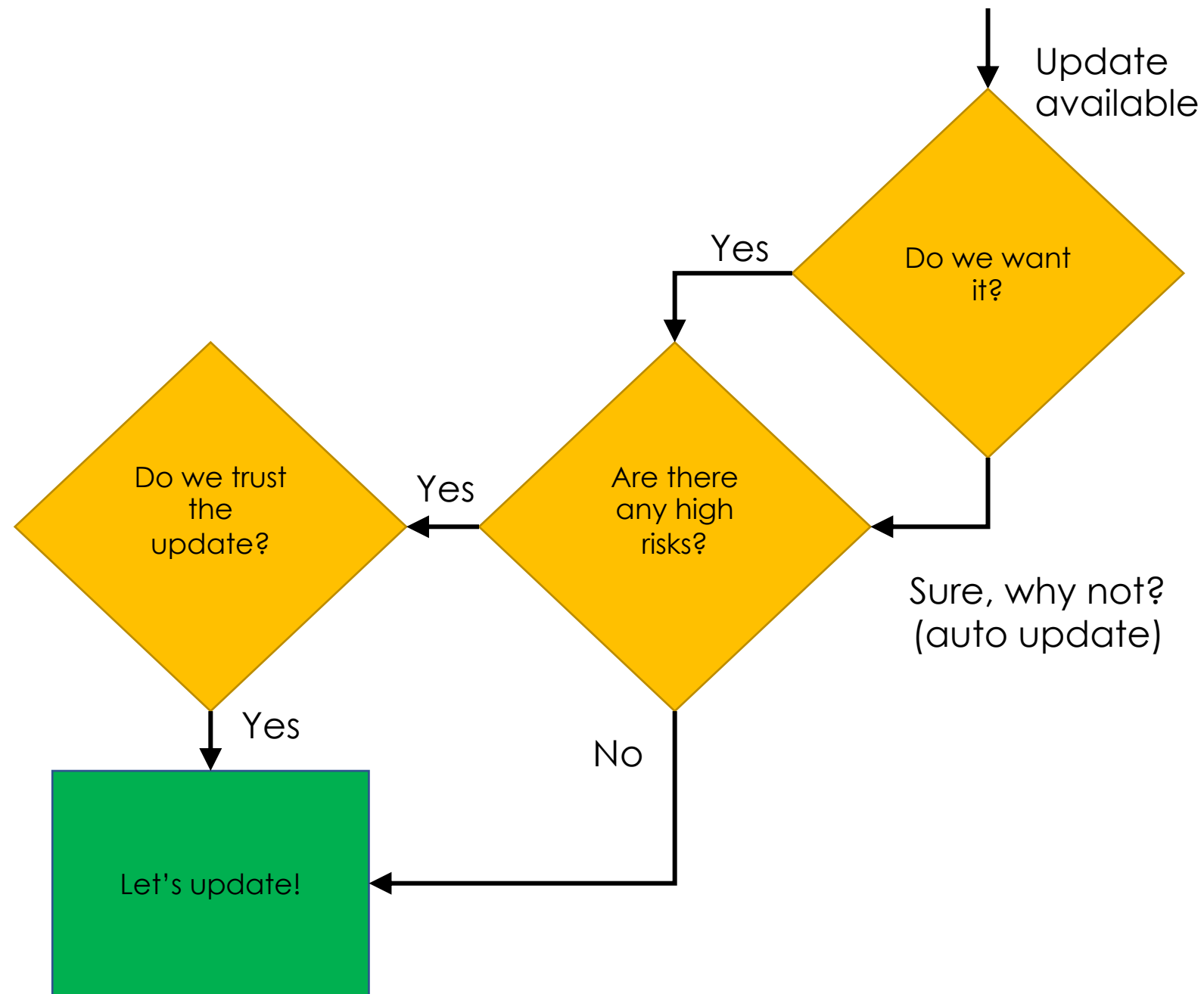# CONTINUOUS UPDATES

- Frequent
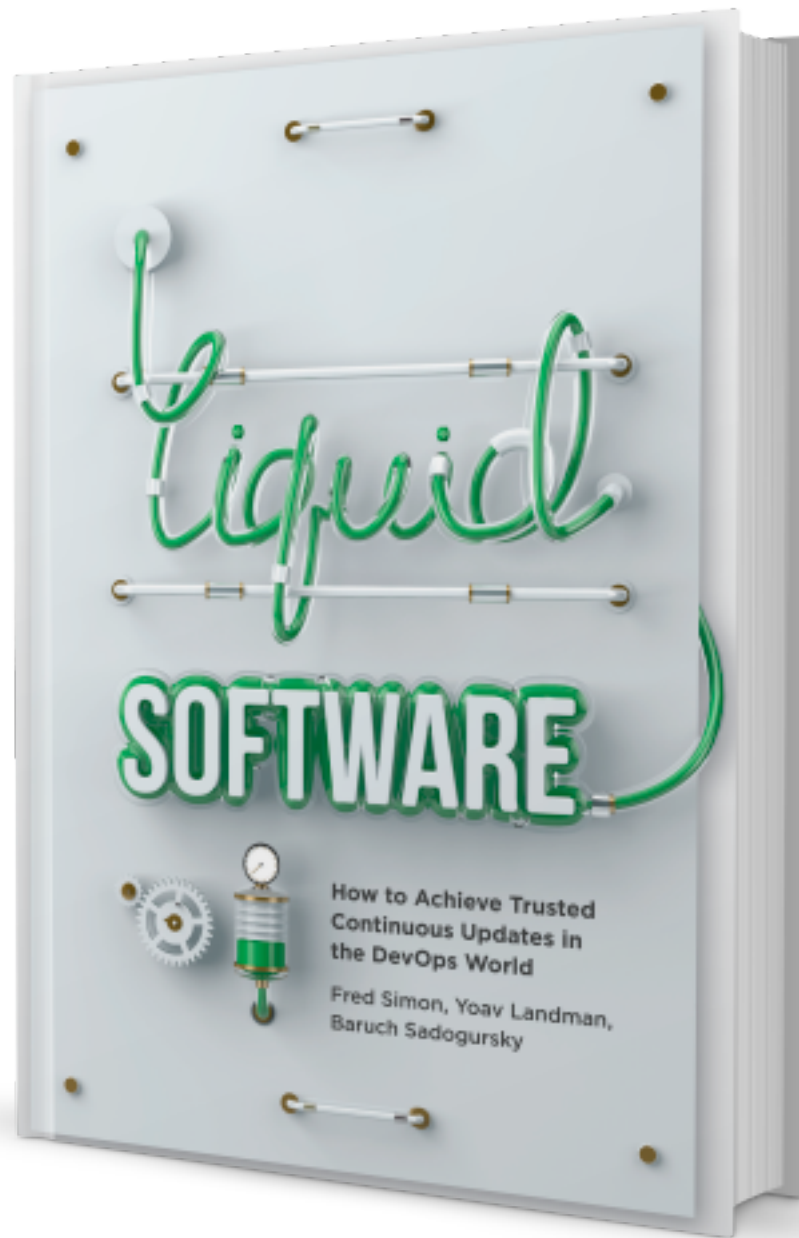- Automatic
- Tested
- Canary
- State-aware
- Observability
- *Local Rollbacks

" *Our goal is to transition from bulk and rare software updates to extremely tiny and extremely frequent software updates;*

*so tiny and so frequent that they provide an illusion of software flowing from development to the update target.*
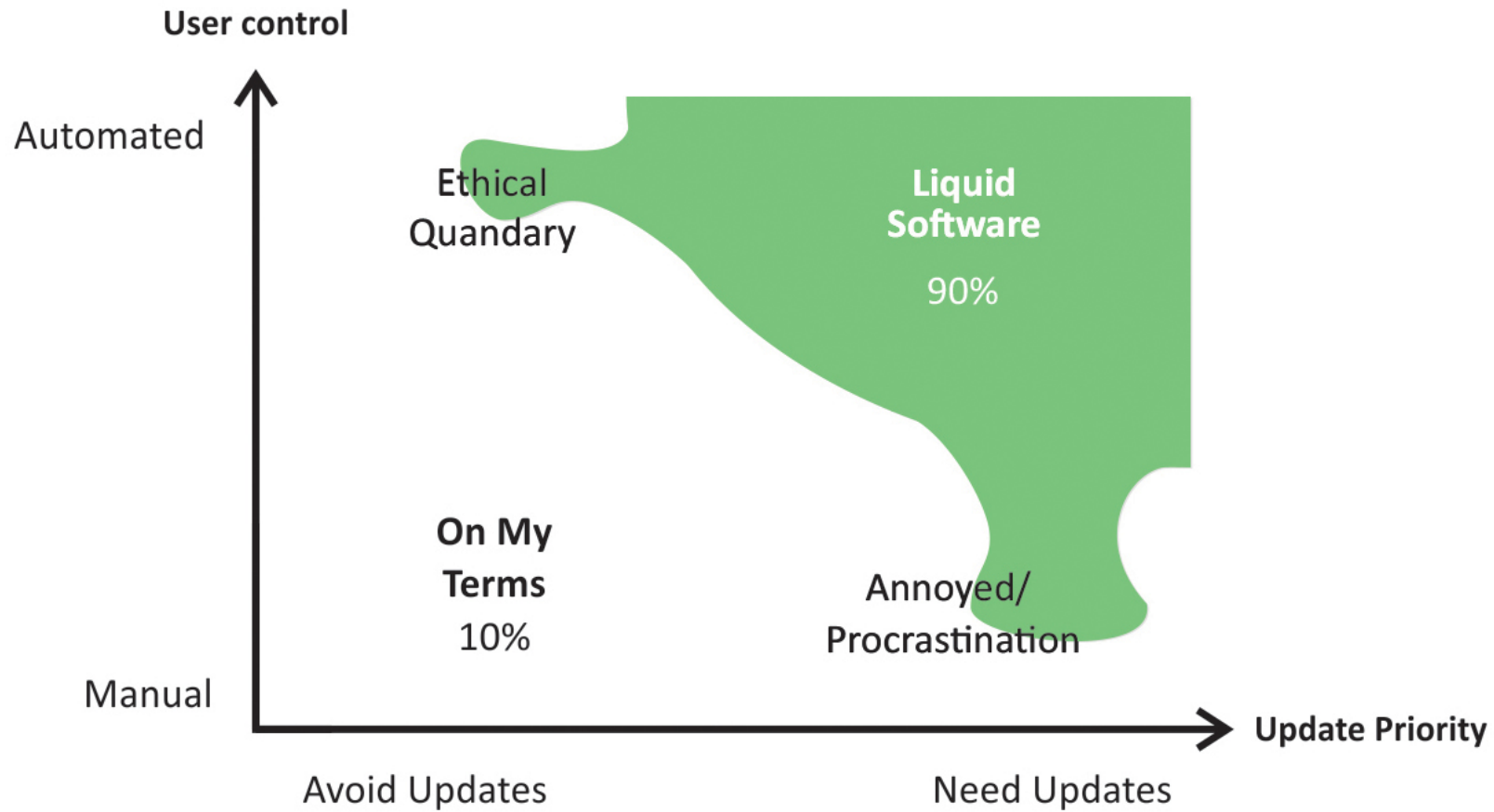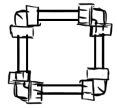
**We call it the Liquid Software vision.**

# Liquid SOFTWARE

How to Achieve Trusted Continuous Updates in the DevOps World

Fred Simon, Yoav Landman, Baruch Sadogursky

# CORNER CASES?



User control

Automated

Ethical
Quandary

**Liquid
Software**

90%

**On My
Terms**

10%

Annoyed/
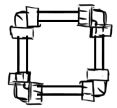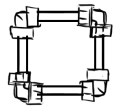Procrastination
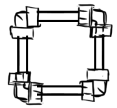
Manual
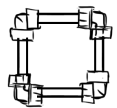
Update Priority

Avoid Updates

Need Updates

# Q&A AND TWITTER ADS

@jbaruch

#DevOpsWorld

#LiquidSoftware

http://liquidsoftware.com

http://jfrog.com/shownotes