DEVOPS PATTERNS & ANTIPATTERNS FOR CONTINUOUS SOFTWARE UPDATES

"What can possibly go wrong?!"

WHY SOFTWARE UPDATES?

```
└➤  bc -v
bc 1.06
Copyright 1991-1994, 1997, 1998, 2000 Free Software Foundation, Inc.
```

WHO ARE WE?

USERS!

WHAT DO WE WANT?

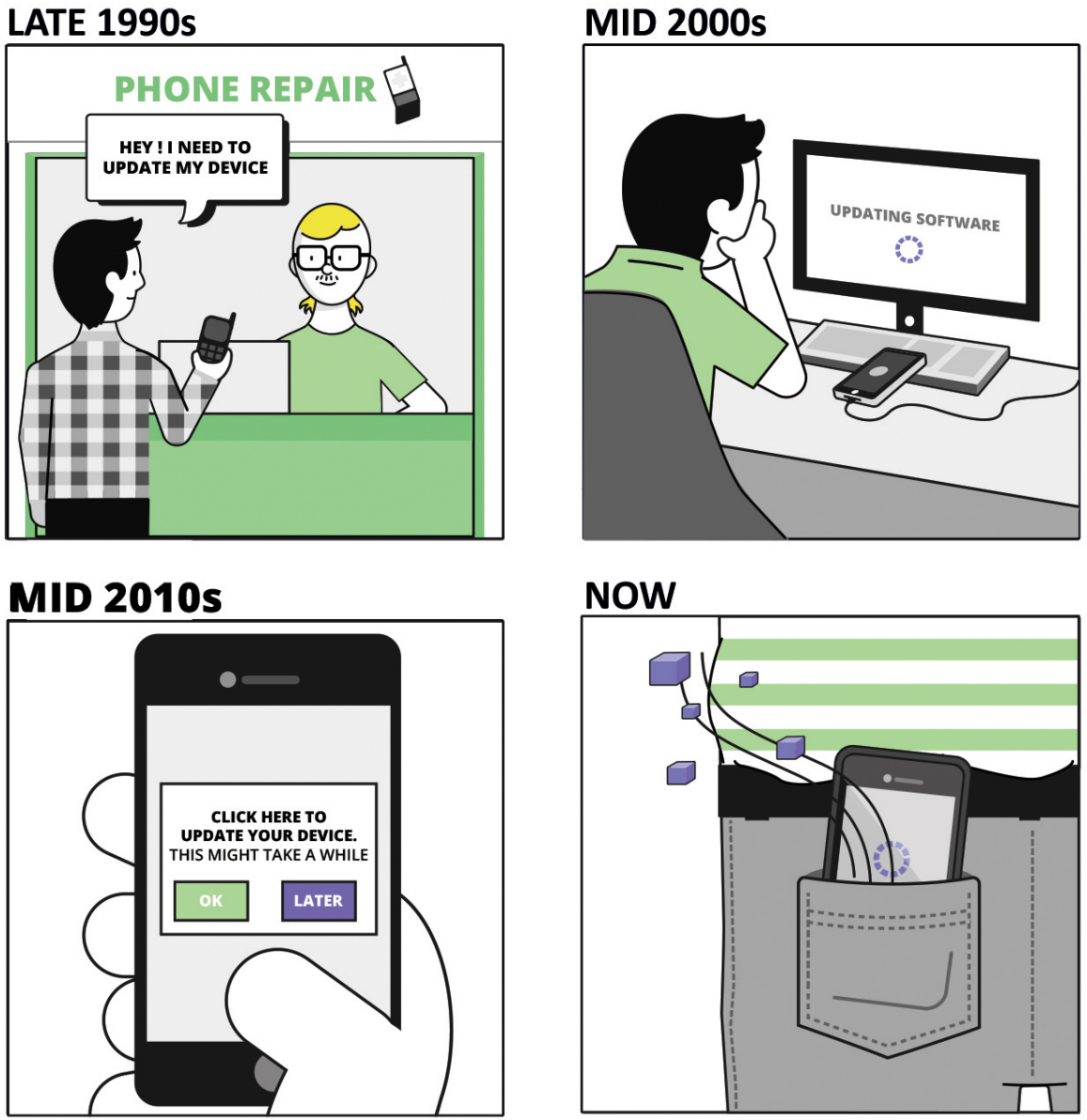
FEATURES!

WHAT DO WE WANT?

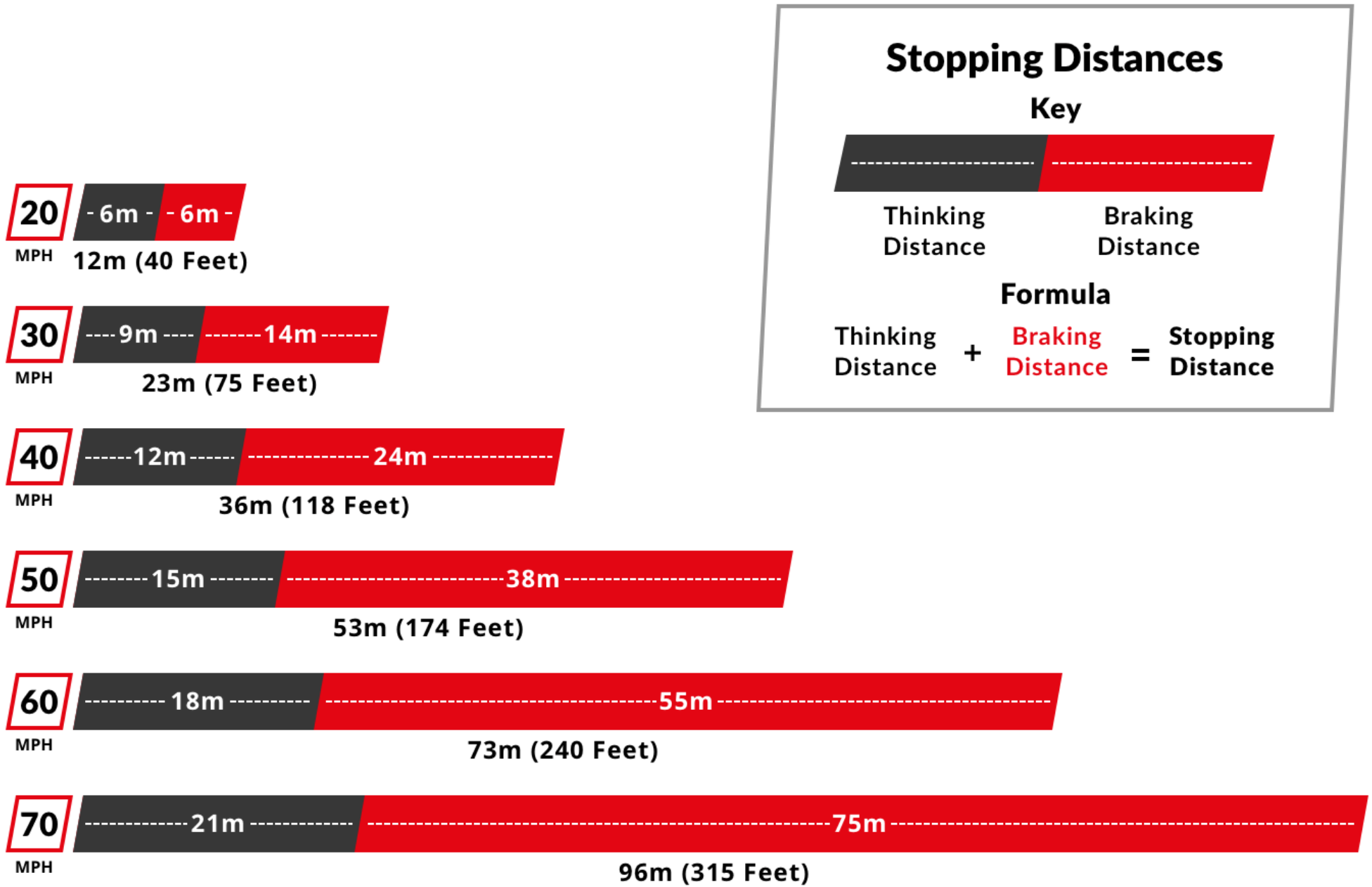
FEATURES!

WHEN DO WE WANT THEM?

NOW!


LATE 1990s
PHONE REPAIR
HEY ! I NEED TO UPDATE MY DEVICE
MID 2000s
UPDATING SOFTWARE
MID 2010s
CLICK HERE TO UPDATE YOUR DEVICE.
THIS MIGHT TAKE A WHILE
OK
LATER
NOW

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


Stopping Distances
Key
Thinking Distance
Braking Distance
Formula
Thinking Distance + Braking Distance = Stopping Distance
20 MPH
6m
6m
12m (40 Feet)
30 MPH
9m
14m
23m (75 Feet)
40 MPH
12m
24m
36m (118 Feet)
50 MPH
15m
38m
53m (174 Feet)
60 MPH
18m
55m
73m (240 Feet)
70 MPH
21m
75m
96m (315 Feet)

IDENTIFY
FIX
DEPLOY

The Register®
Biting the hand that feeds IT

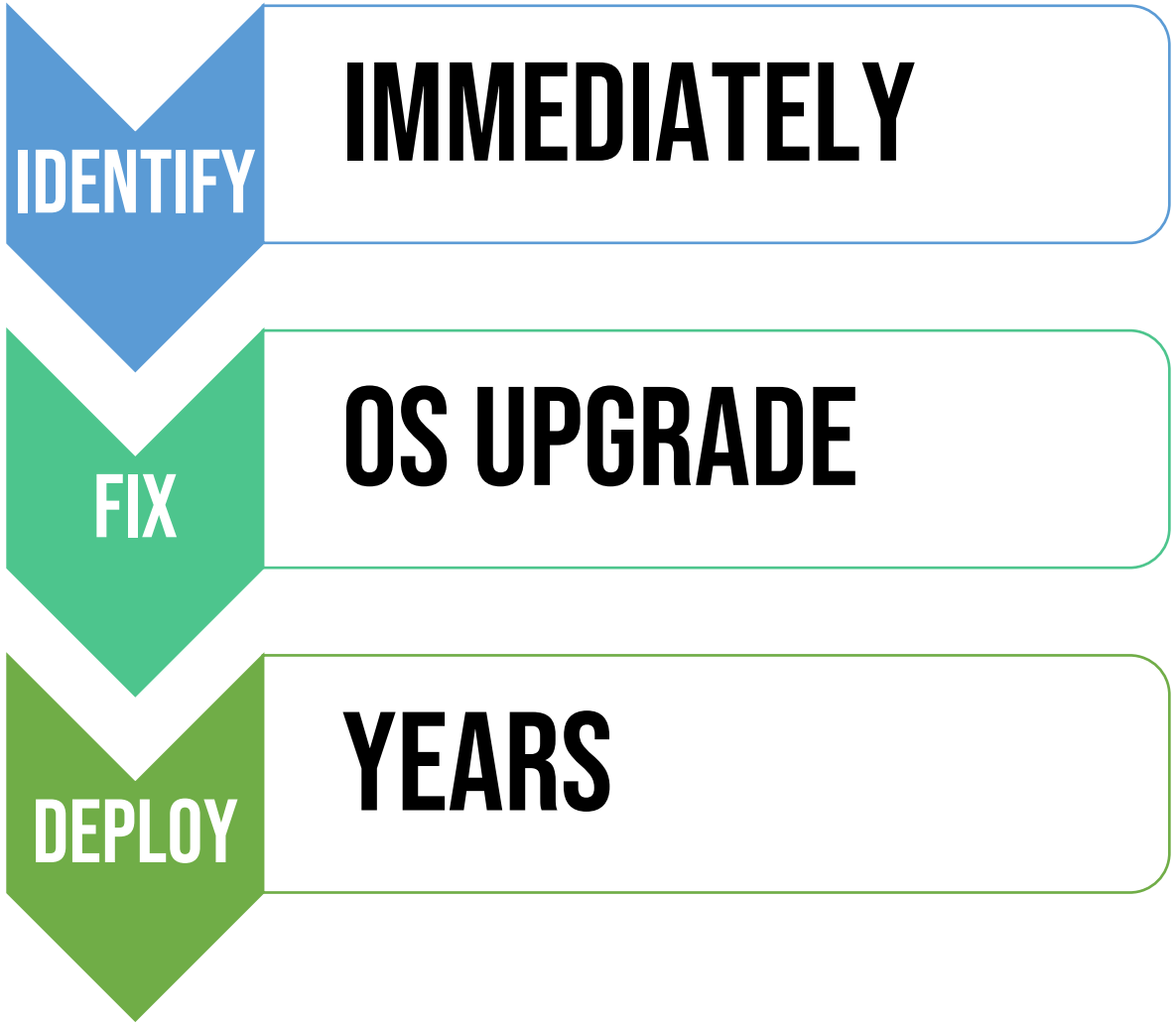
Security

UK hospital meltdown after ransomware worm uses NSA vuln to raid IT

Docs use pen and paper after computers scrambled amid global outbreak

By Kat Hall 12 May 2017 at 14:22 339 SHARE ▼

Final update UK hospitals have effectively shut down and are turning away non-emergency patients after ransomware ransacked its networks.



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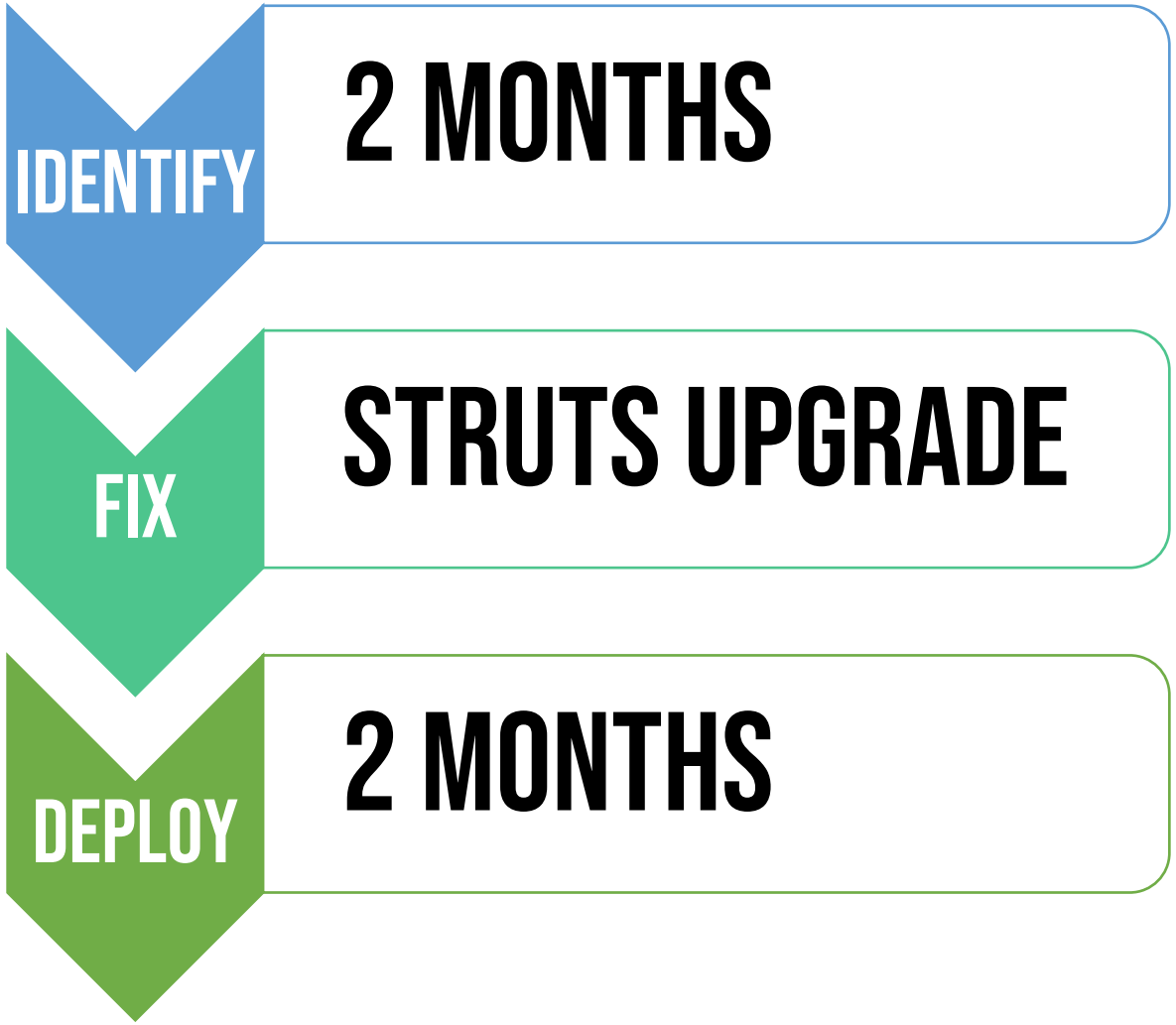
Security

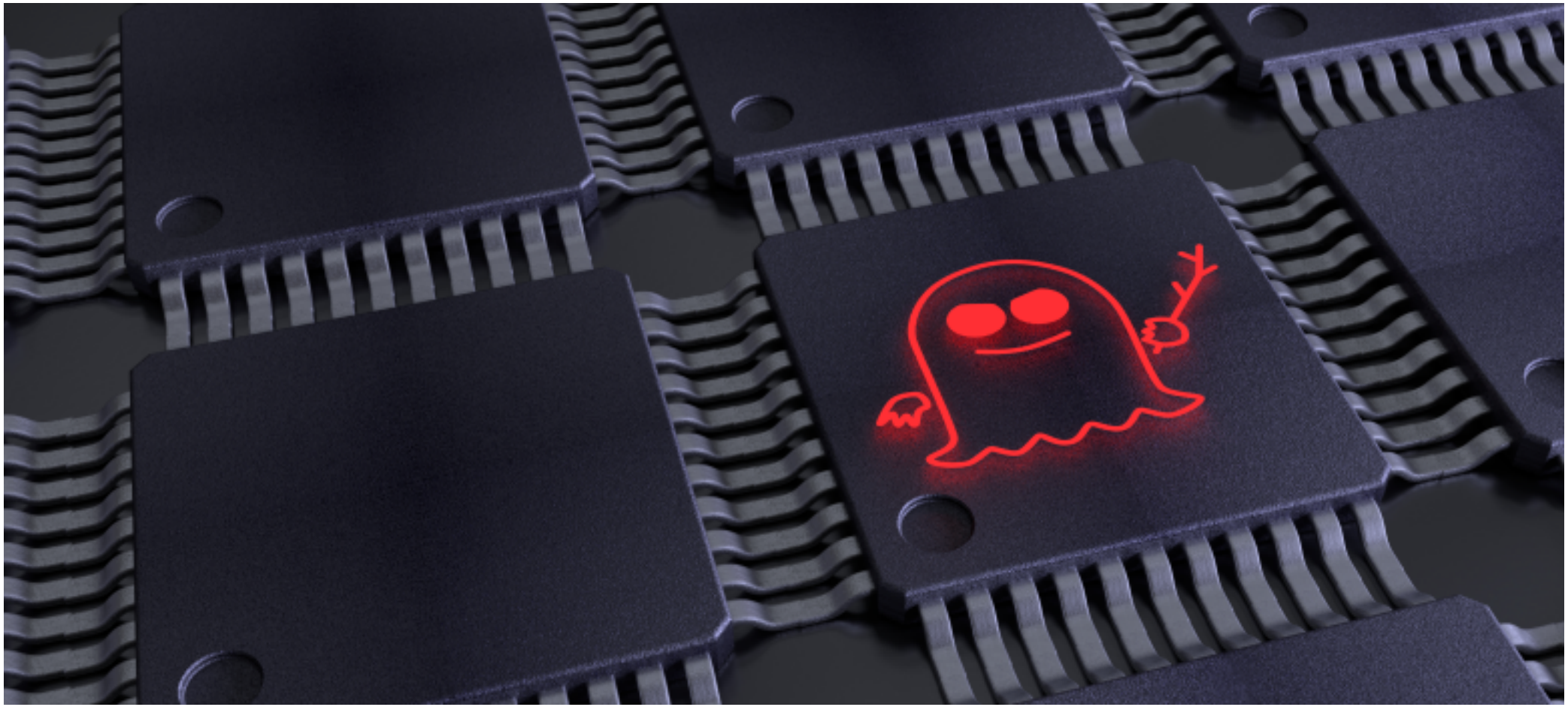
Stand up who HASN'T been hit in the Equifax mega-hack – whoa, whoa, sit down everyone

143m in US, unknown number in UK, Canada – gulp!

By Iain Thomson in San Francisco 7 Sep 2017 at 22:11

Vid Global credit reporting agency Equifax admitted today it suffered a massive breach of security that could affect almost half of the US population.





Computing

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 some threats impossible to defeat.

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

Computing

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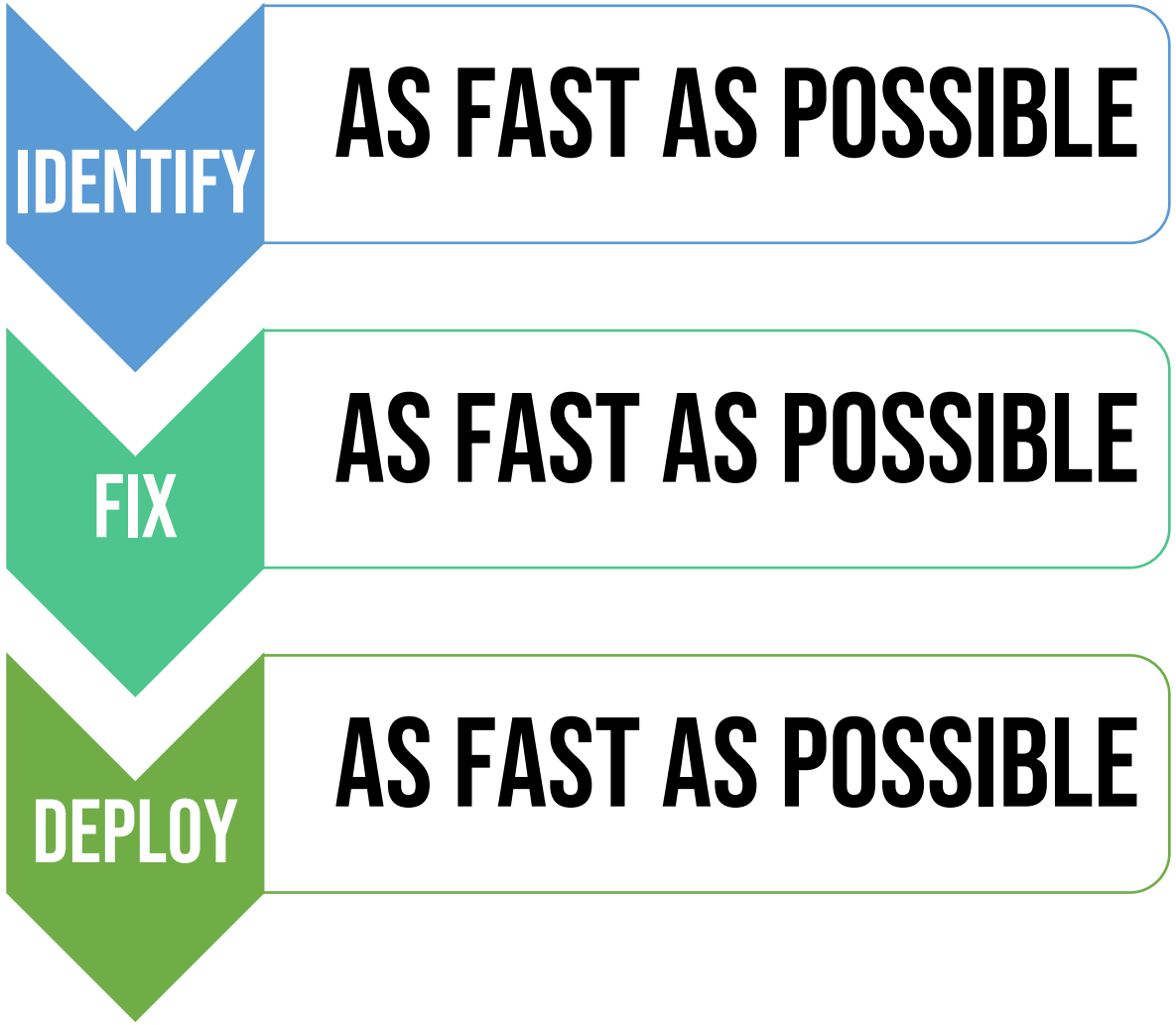


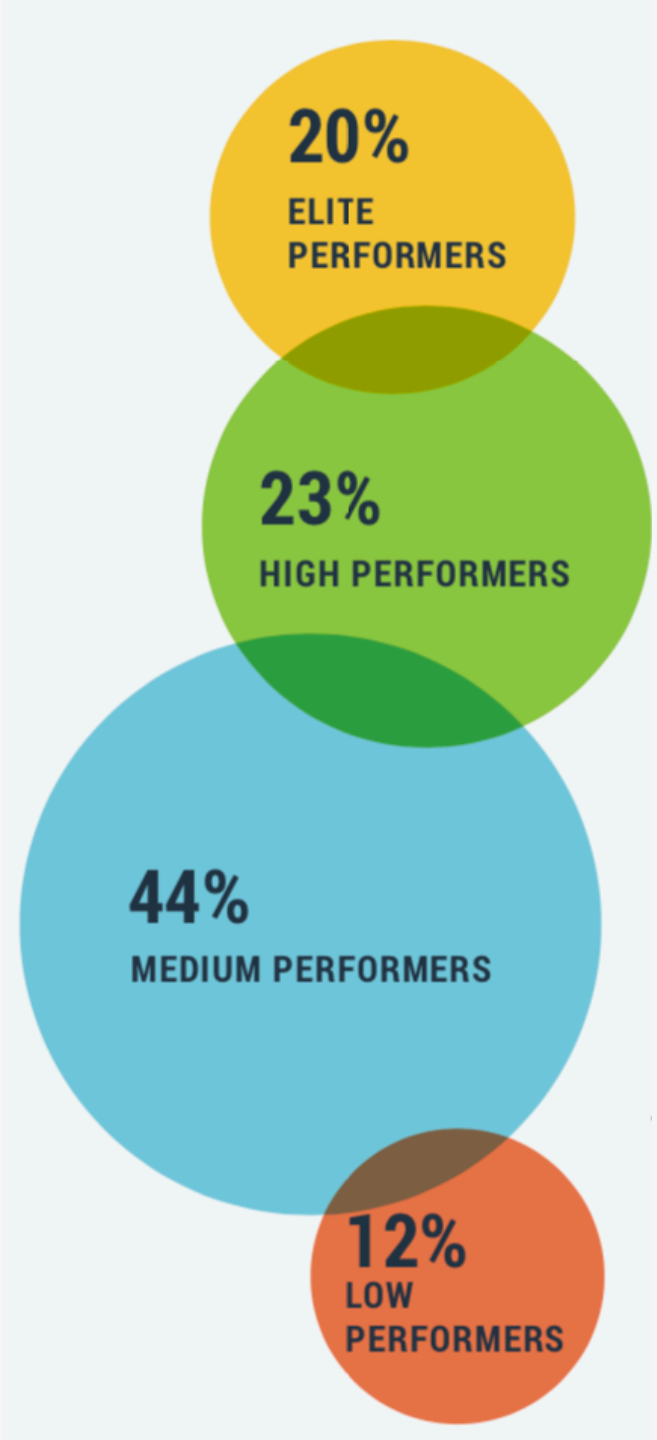
ACCELERATE

State of DevOps 2019

Sponsored by

WHO TOOK THE SURVEY?

DORA's research provides insight into software development and DevOps practices applied in industry, backed by scientific studies spanning six years with over 31,000 survey responses from working professionals. This year, almost 1,000[2] individuals from a range of industries around the world added their voices to the 2019 Report. Overall, we see similar representation across key demographic and firmographic measures when compared to last year, other than a noticeable drop in the reported percentage of women on teams.


20%
ELITE
PERFORMERS
23%
HIGH PERFORMERS
44%
MEDIUM PERFORMERS
12%
LOW
PERFORMERS

Aspect of Software Delivery Performance*	Elite
Deployment frequency For the primary application or service you work on, how often does your organization deploy code to production or release it to end users?	On-demand (multiple deploys per day)

THIS IS NOT
A NEW IDEA!

- XP: short feedback
- Scrum: reducing cycle time to absolute minimum
- TPS: Decide as late as possible and Deliver as fast as possible
- Kanban: Incremental change

BARUCH SADOGURSKY

CHIEF STICKER OFFICER

(ALSO 🎩 OF DEVELOPER ADVOCACY)

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@JBARUCH

+1(408)890-9281

JFrog

SHOWNOTES

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  - 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

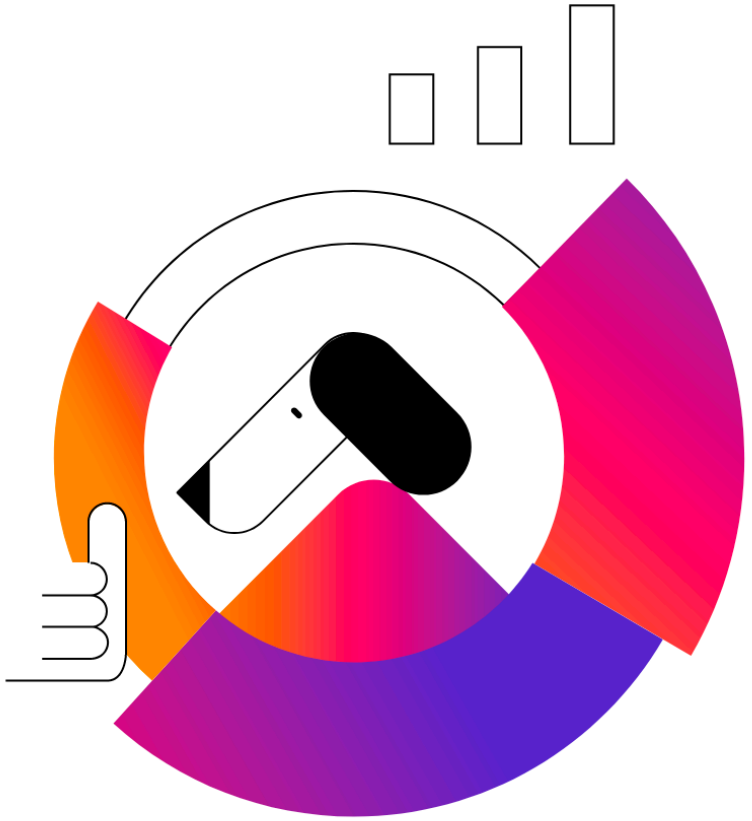
JET BRAINS

2017 | 2018 English

The State of Developer Ecosystem 2019

In the beginning of 2019, we polled almost 7,000 developers to identify the State of Developer Ecosystem.

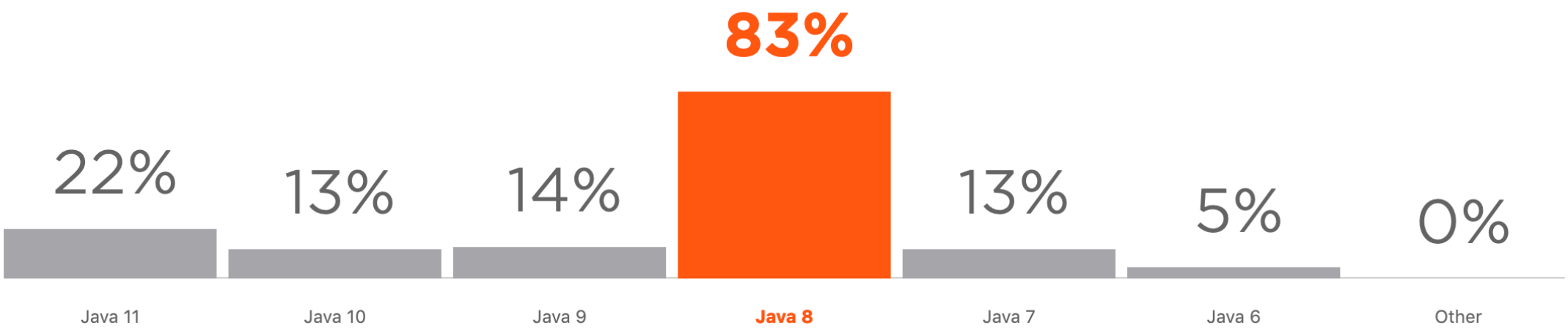
Here's what we learned.



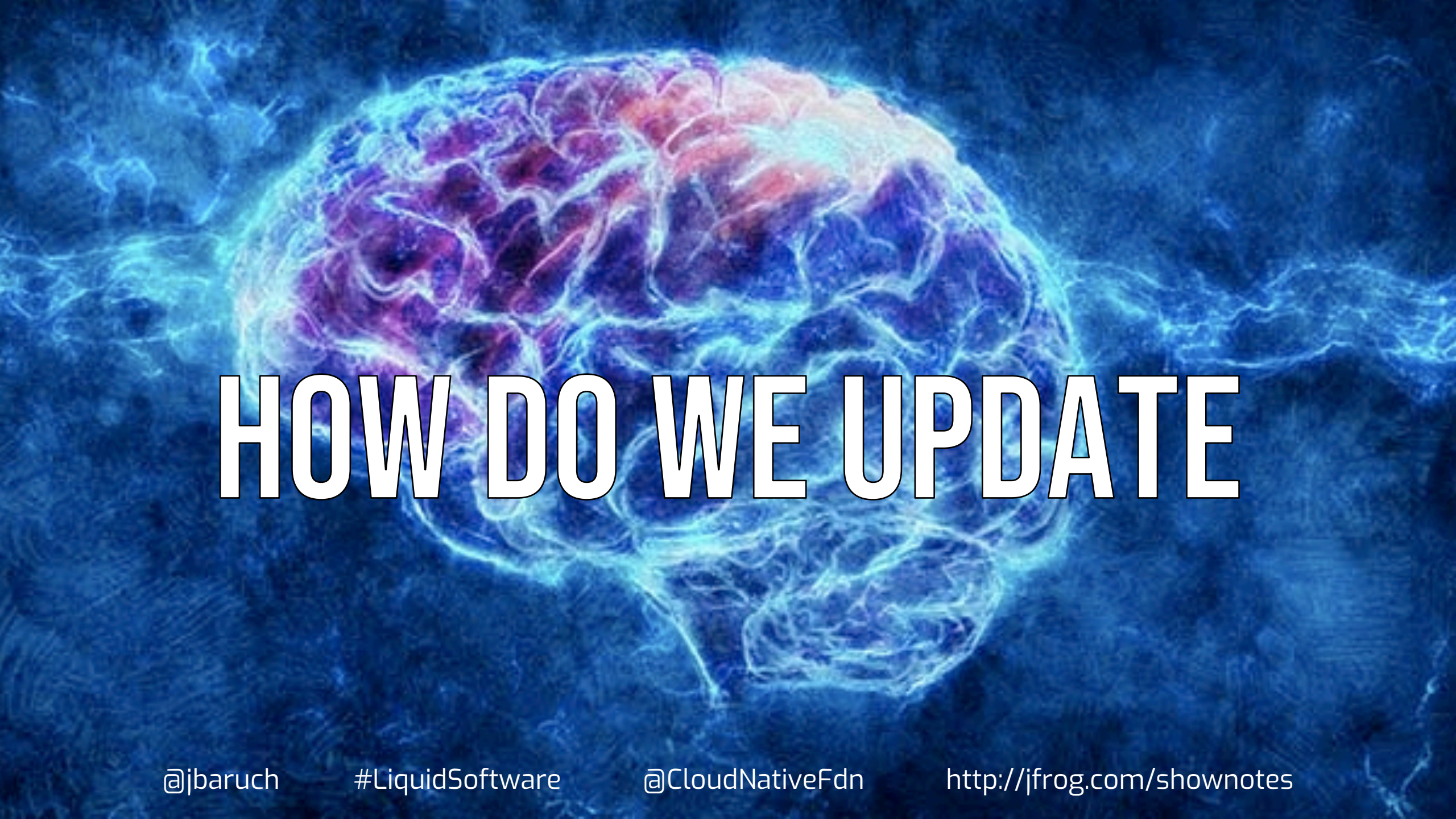
@jbaruch #LiquidSoftware @CloudNativeFdn http://jfrog.com/shownotes

The Java questions were only shown to the developers who chose Java as one of their three primary programming languages.

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.


HOW DO WE UPDATE

Update available

Do we want it?

Yes

No

Are there any high risks?

Yes

No

Do we trust the update?

No

Yes

Let's update!

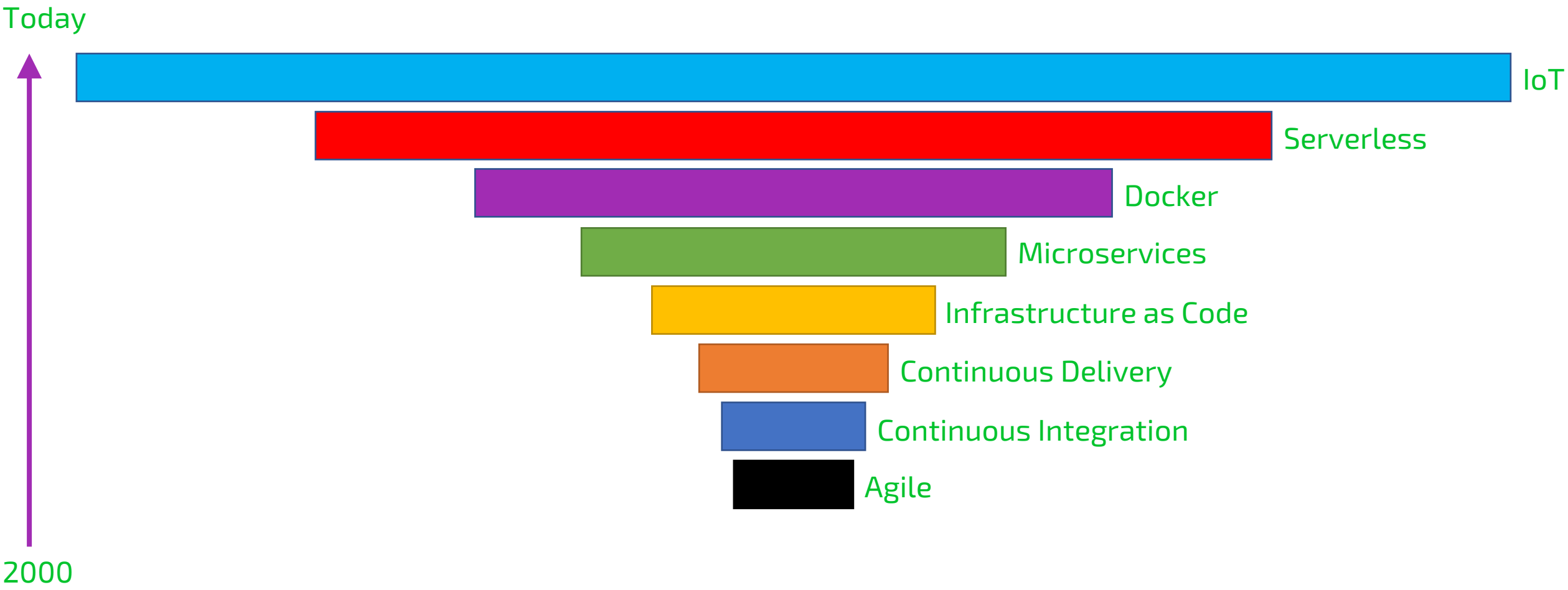
Yes

No

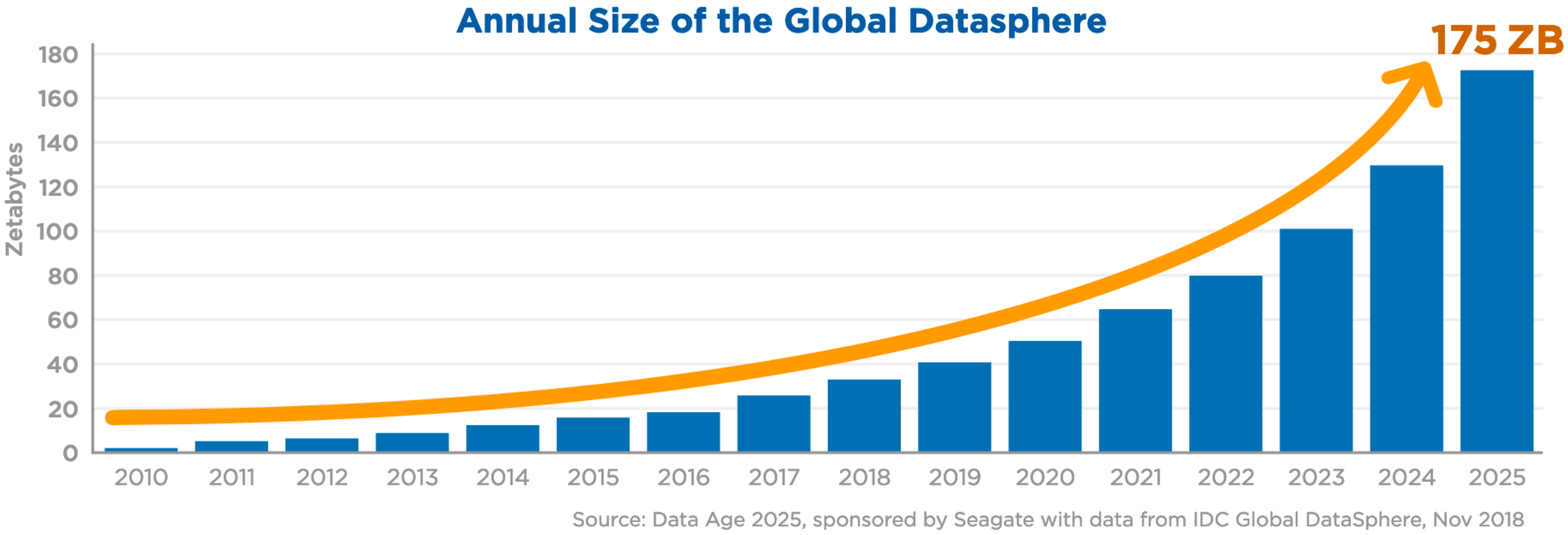
How about no

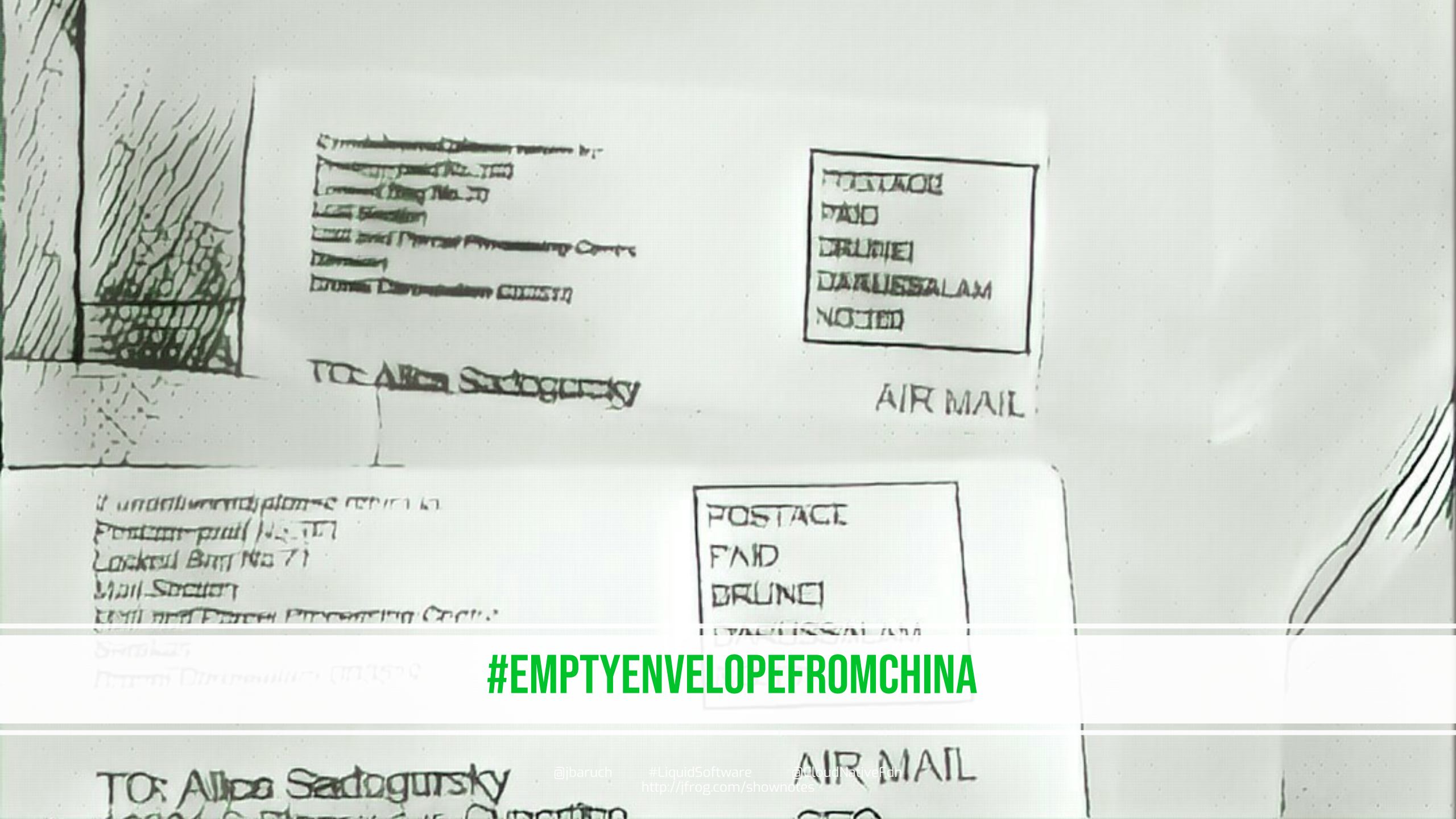
HI, I'M ALAN, FROM THE QUALITY ASSURANCE DEPART-MENT.
Dilbert.com @ScottAdamsSays
DON'T BE WORRIED ABOUT QUALITY. I ASSURE YOU WE HAVE PLENTY OF IT.
9-16-16 © 2016 Scott Adams, Inc. /Dist. by Universal Uclick
THAT'S ALL YOU DO?
HEY, I DON'T TELL YOU HOW TO DO YOUR JOB.

NUMBER OF ARTIFACTS AS A SYMPTOM OF COMPLEXITY

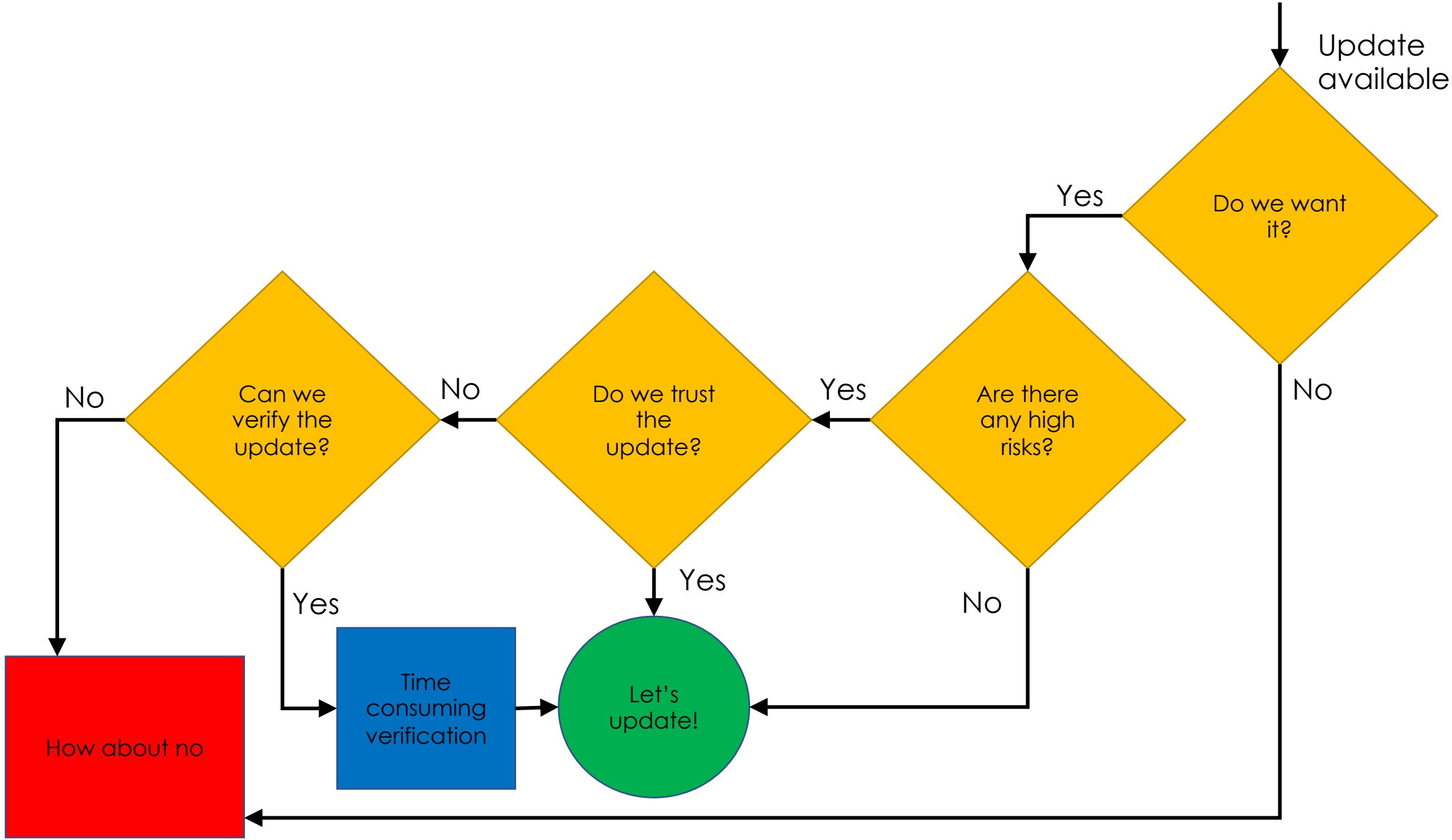


THE PROBLEM IS NOT THE CODE, IT'S THE DATA. BIG DATA.





#EMPTYENVELOPEFROMCHINA

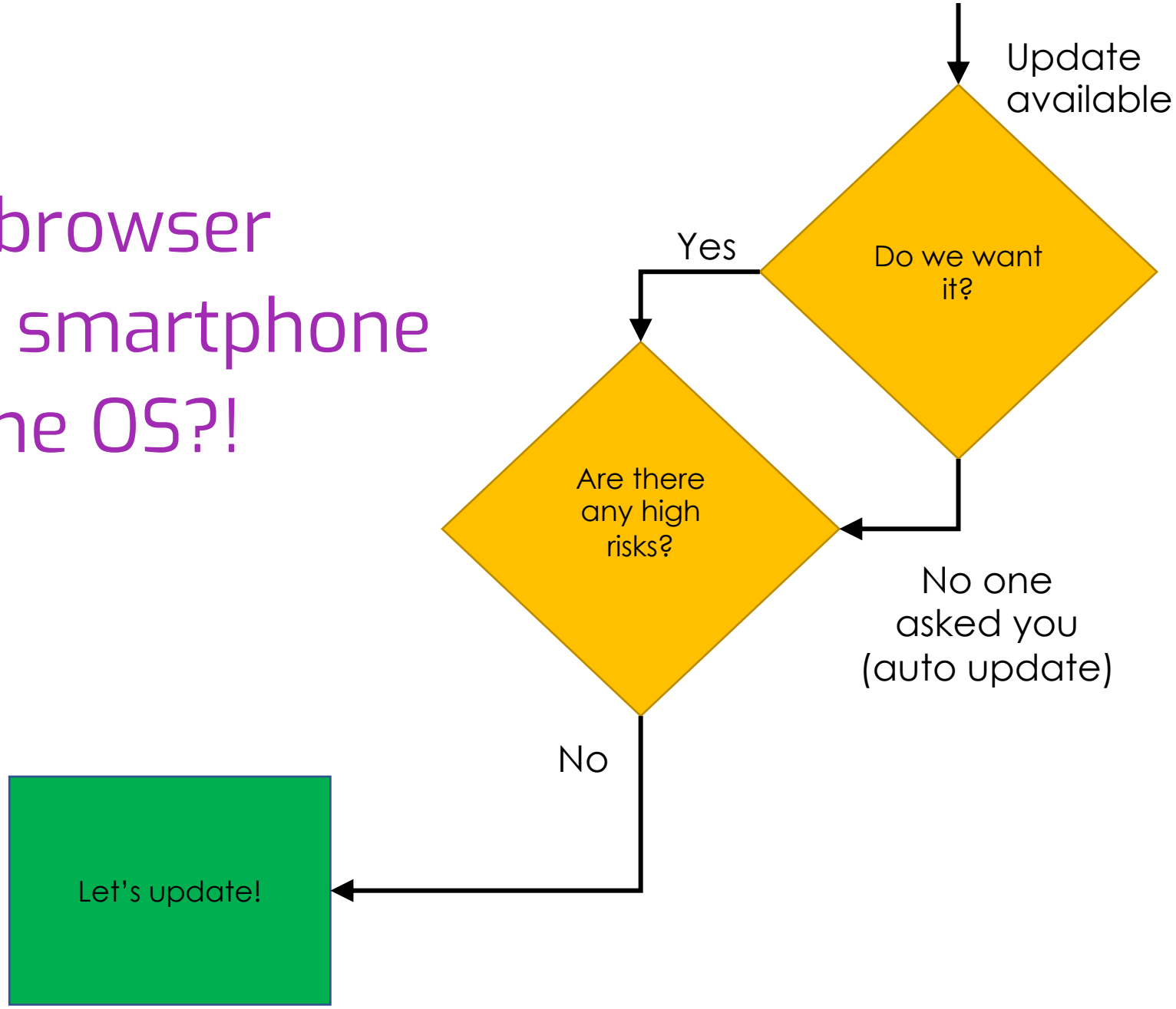

Update available
Do we want it?
Yes
No
Are there any high risks?
Yes
No
Do we trust the update?
Yes
No
Can we verify the update?
Yes
No
Let's update!
Time consuming verification
How about no

Features that we want

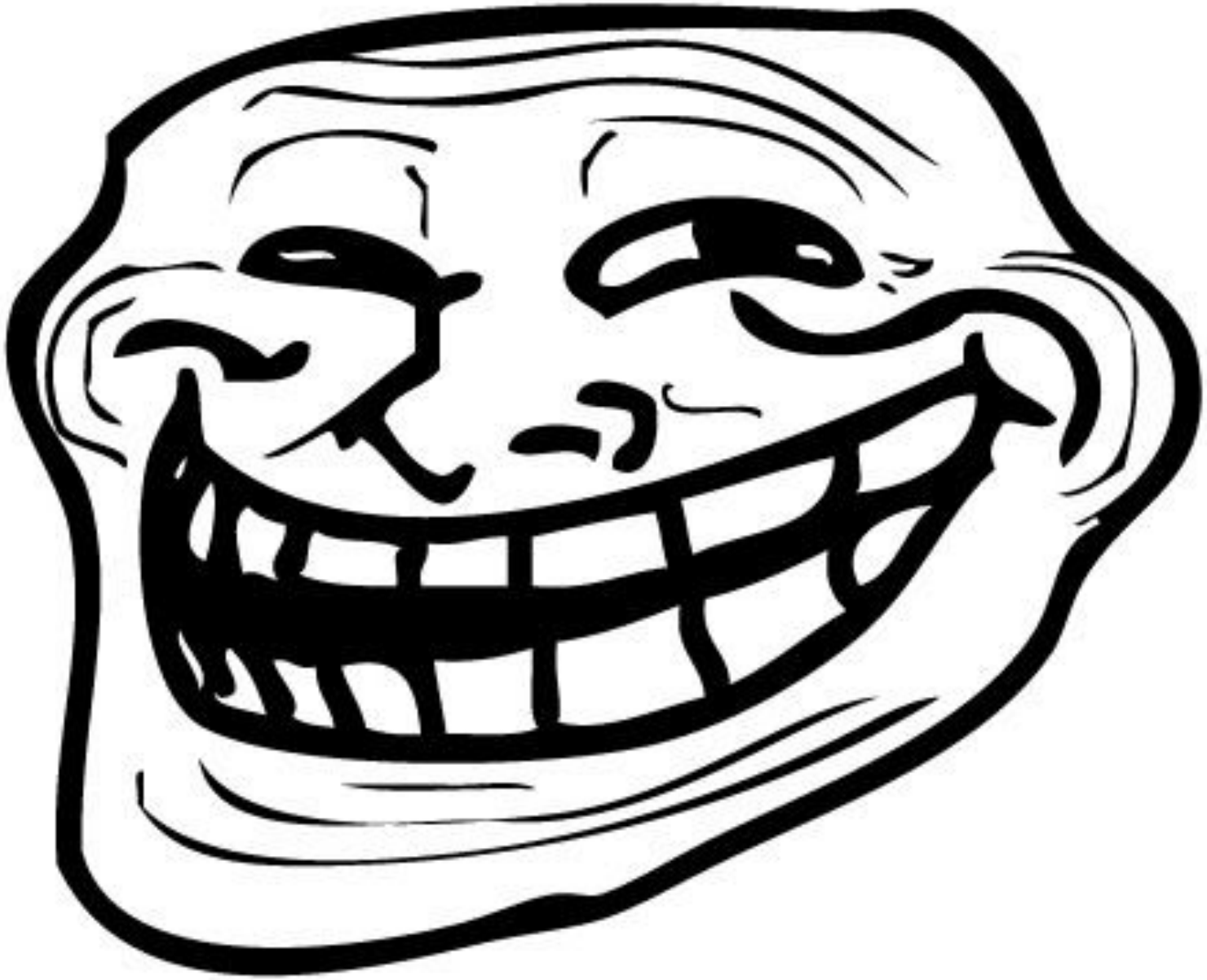
Acceptance tests costs

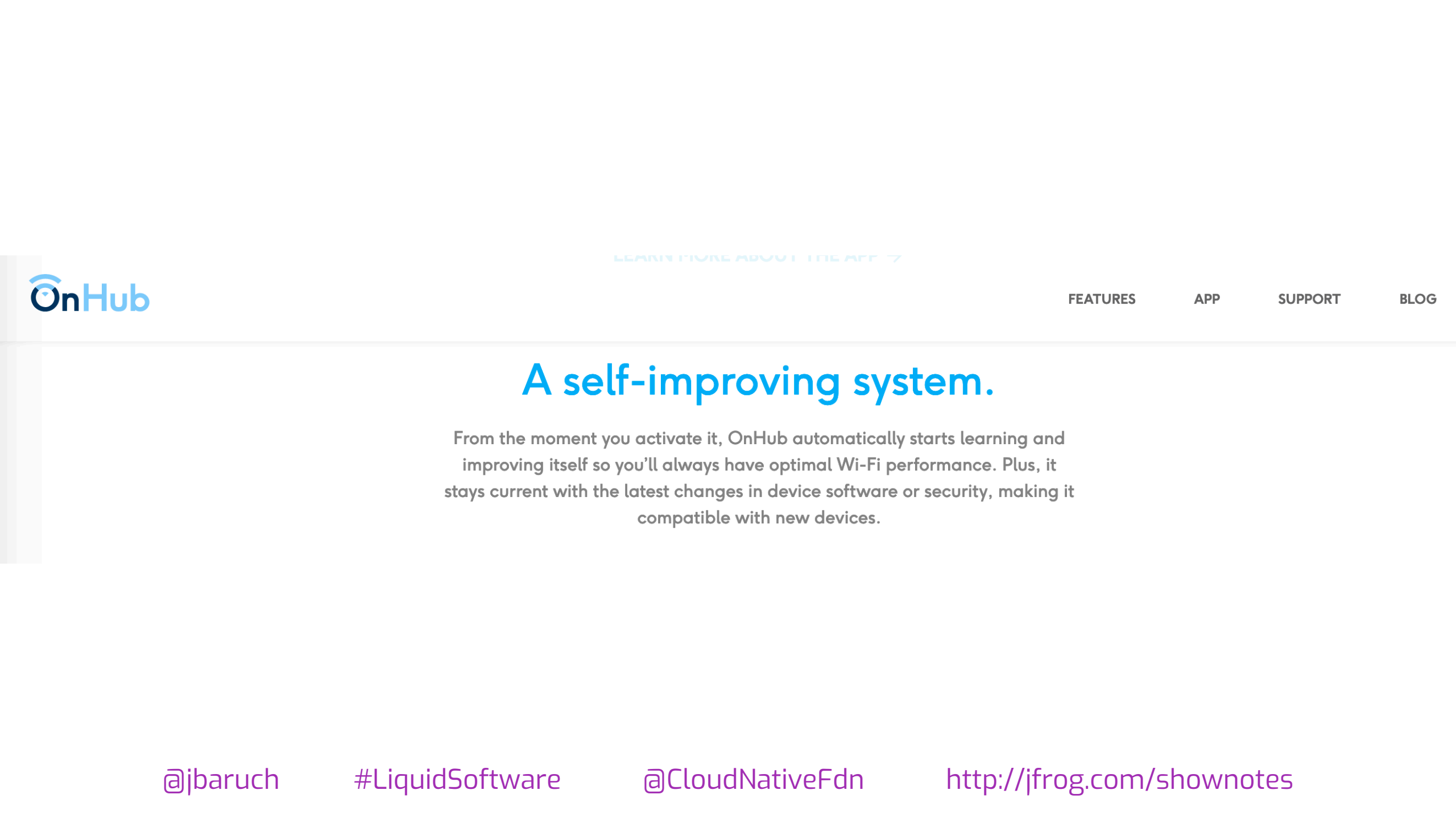
Cheating is wrong. Cheating is wrong.
Cheating is wrong. Cheating is wrong.
Cheating is wrong. Cheating is wrong.
Cheating is wrong. Cheating is wrong.
Cheating is wrong. Cheating is wrong.
Cheating is wrong. Cheating is wrong.

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



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.

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.

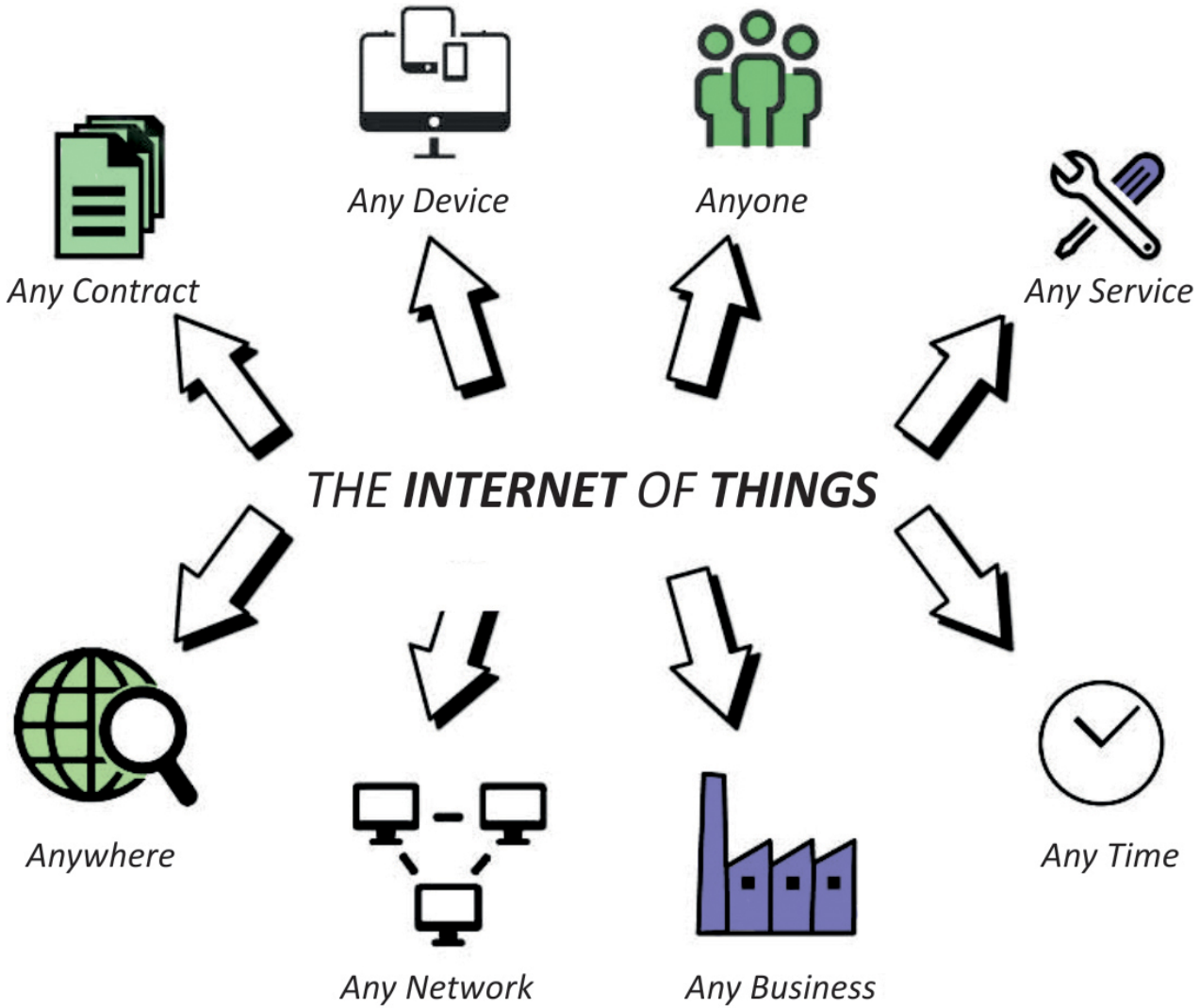
We know how important Wi-Fi is to you and share our sincerest apologies for the inconvenience this has caused.

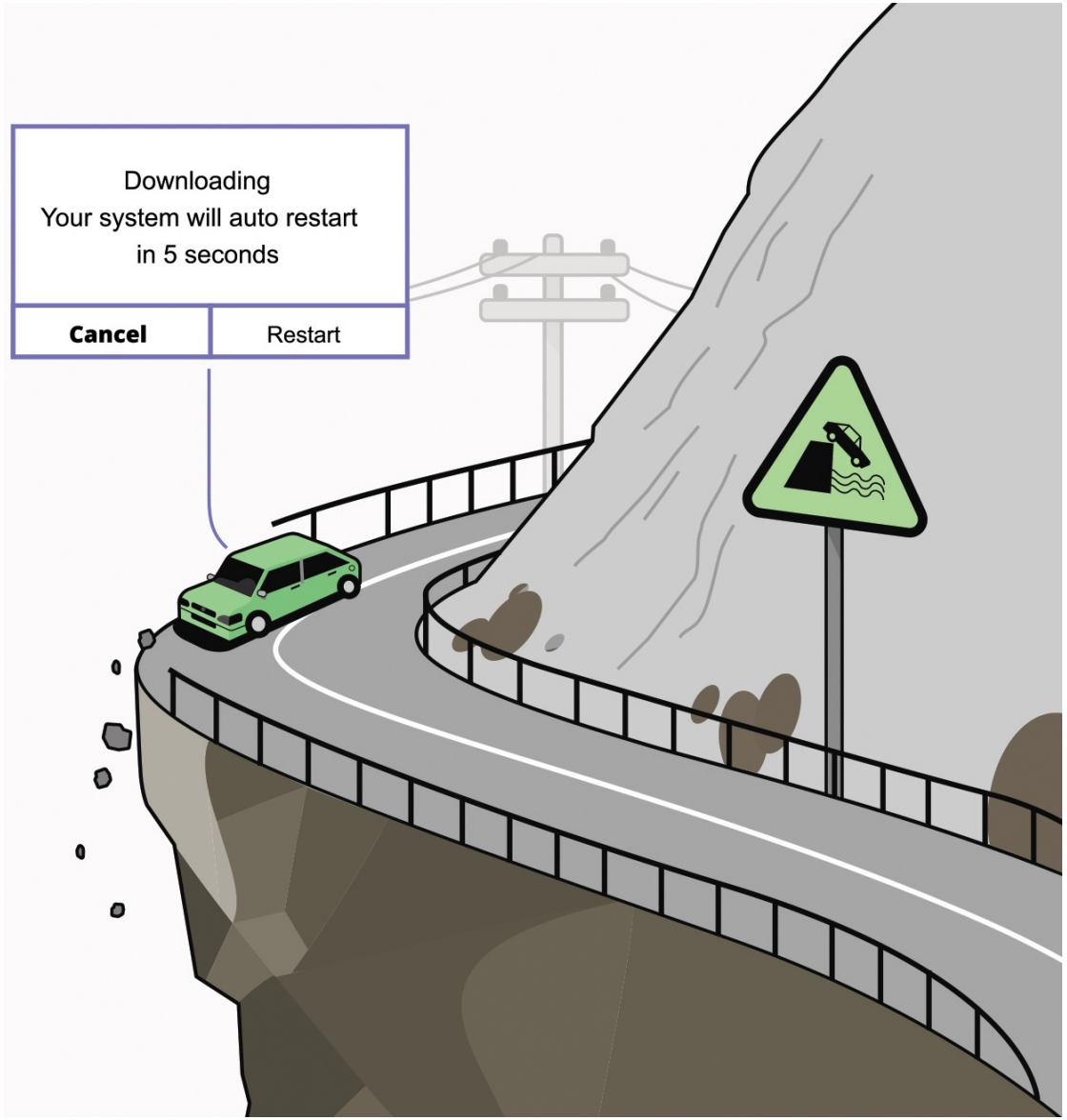
Ben Brown On behalf of the Google Wifi and OnHub team

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

Confirm Display Settings
Your desktop has been reconfigured. Do you want to keep these settings?
Reverting in 9 seconds
Yes
No


Any Device
Anyone
Any Contract
Any Service
THE INTERNET OF THINGS
Anywhere
Any Time
Any Network
Any Business


Downloading
Your system will auto restart
in 5 seconds
Cancel
Restart

Jaguar I-PACE Recalled, Needs Software Update To Fix Regenerative Brakes

JUN 08, 2019 at 9:20AM

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. Also, you can't force an upgrade.
- 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.

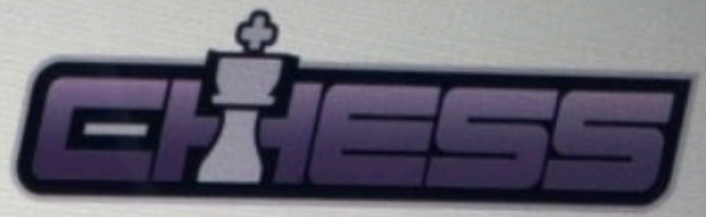
Am I the only person who only uses autopilot driving solo due to phantom braking? Tesla needs to fix this ASAP.

79 Comments Give Award Share Save Hide Report

What's New in This Update

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.

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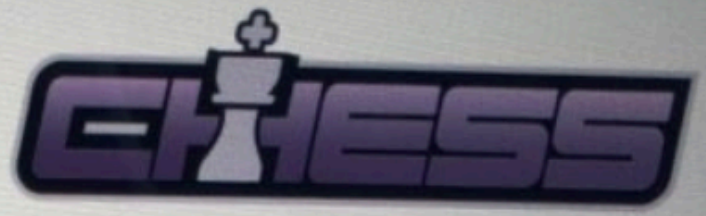

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CONTINUOUS UPDATES PATTERN: CONTINUOUS UPDATES

- Problem: In batch updates important features wait for non-important features.
- Solution: Implement continuous updates.

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	✓	✗

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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.

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Biting the hand that feeds IT

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.

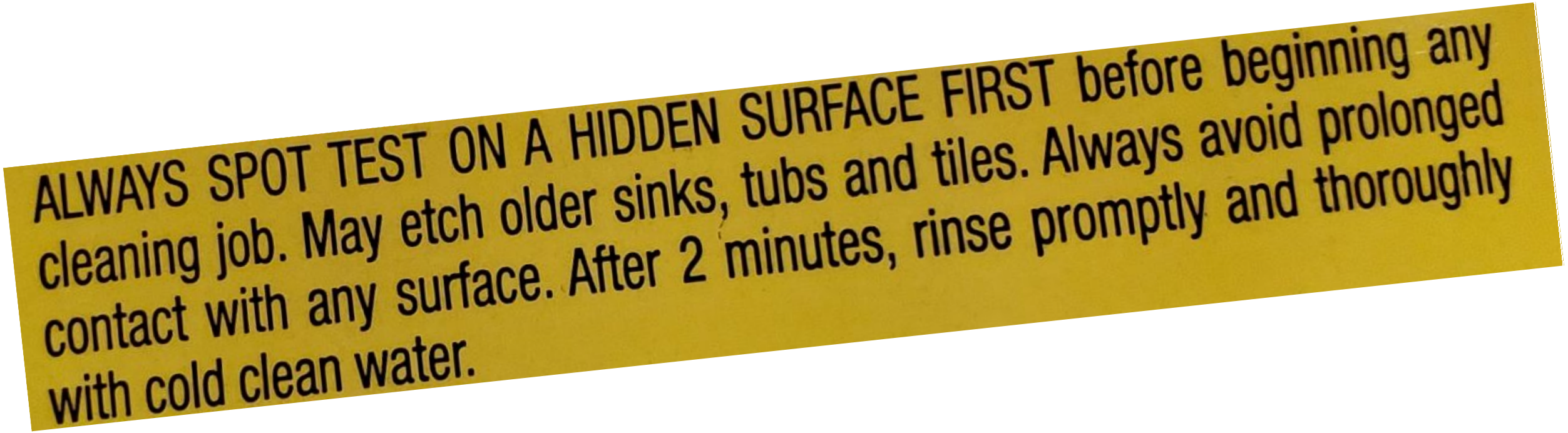
This time it wasn't Verizon wot dunnit; Cloudflare engineered this outage all by itself.

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: PROGRESSIVE DELIVERY

- Problem: Releasing a bug affects ALL the users.
- Solution: Release to a small number of users first effectively reducing the blast radius and observe. If a problem occurs, stop the release, revert or update the affected users.


ALWAYS SPOT TEST ON A HIDDEN SURFACE FIRST before beginning any cleaning job. May etch older sinks, tubs and tiles. Always avoid prolonged contact with any surface. After 2 minutes, rinse promptly and thoroughly with cold clean water.

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

APPS ENTERTAINMENT FILM

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

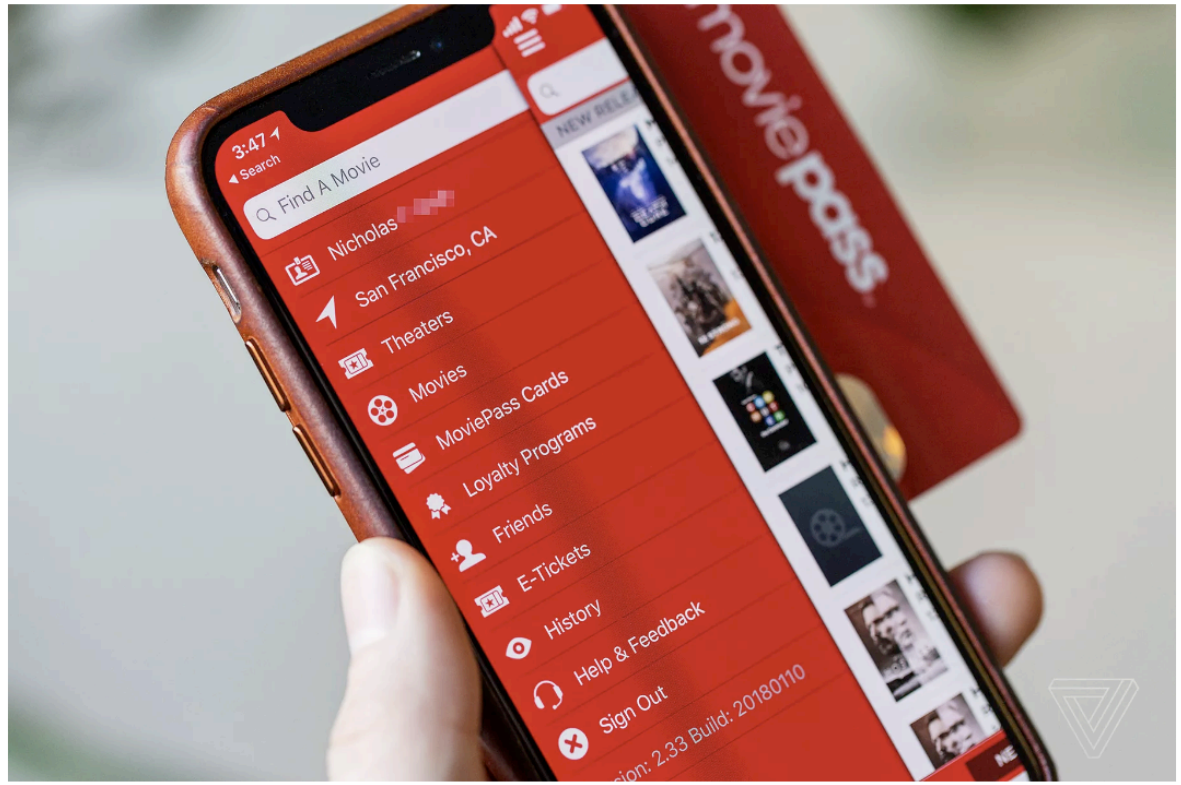


Photo by Vjeran Pavic / The Verge

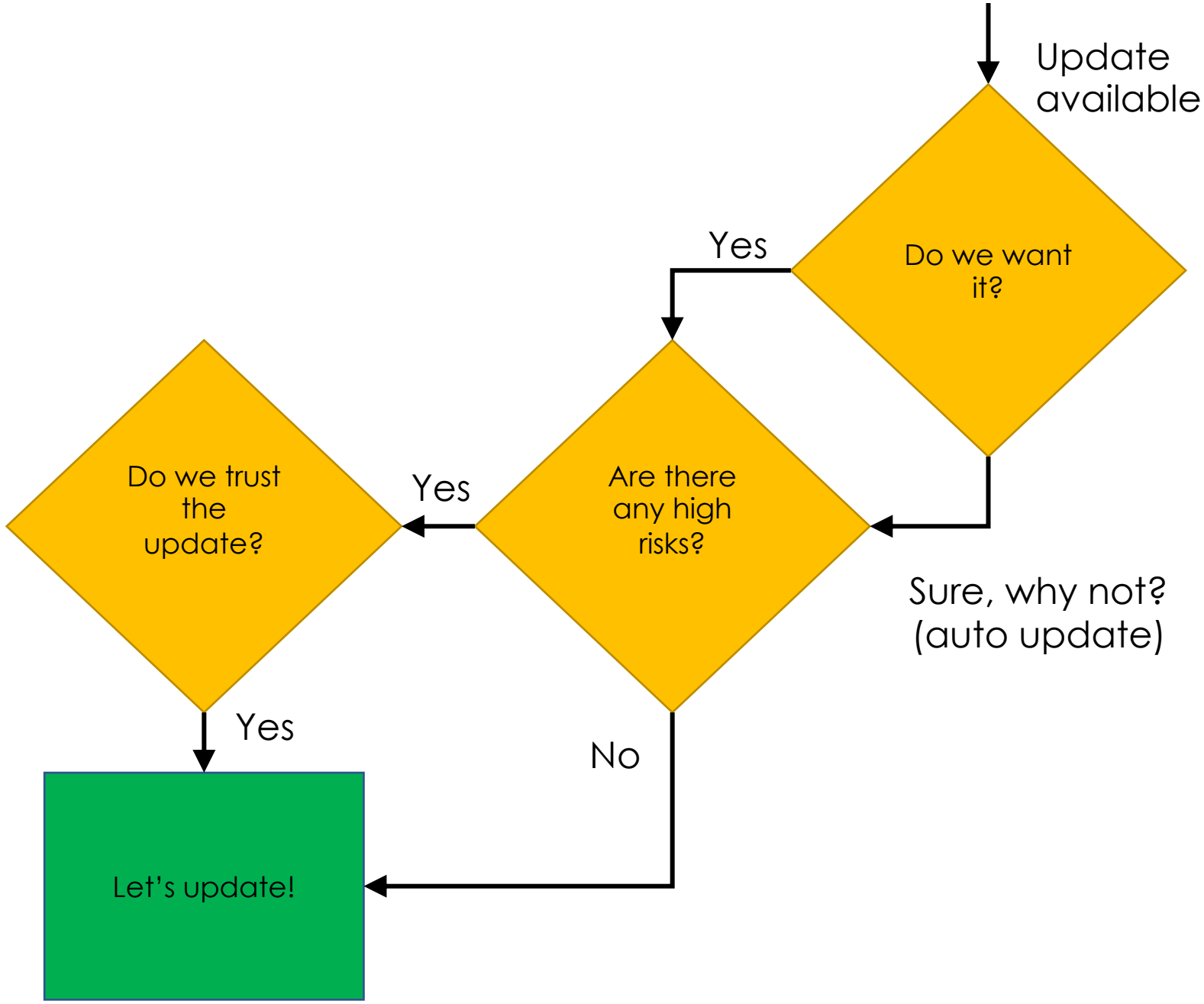
MoviePass, the long-embattled film subscription service, has shut down for "several weeks" in order to complete work on an updated version of its app and to recapitalize for when the service relaunches. "There's never a good time to have to do this," MoviePass CEO Mitch Lowe said in a statement, "but 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 to perform an update.
- Solution: Perform zero-downtime OTA small and frequent continuous updates.

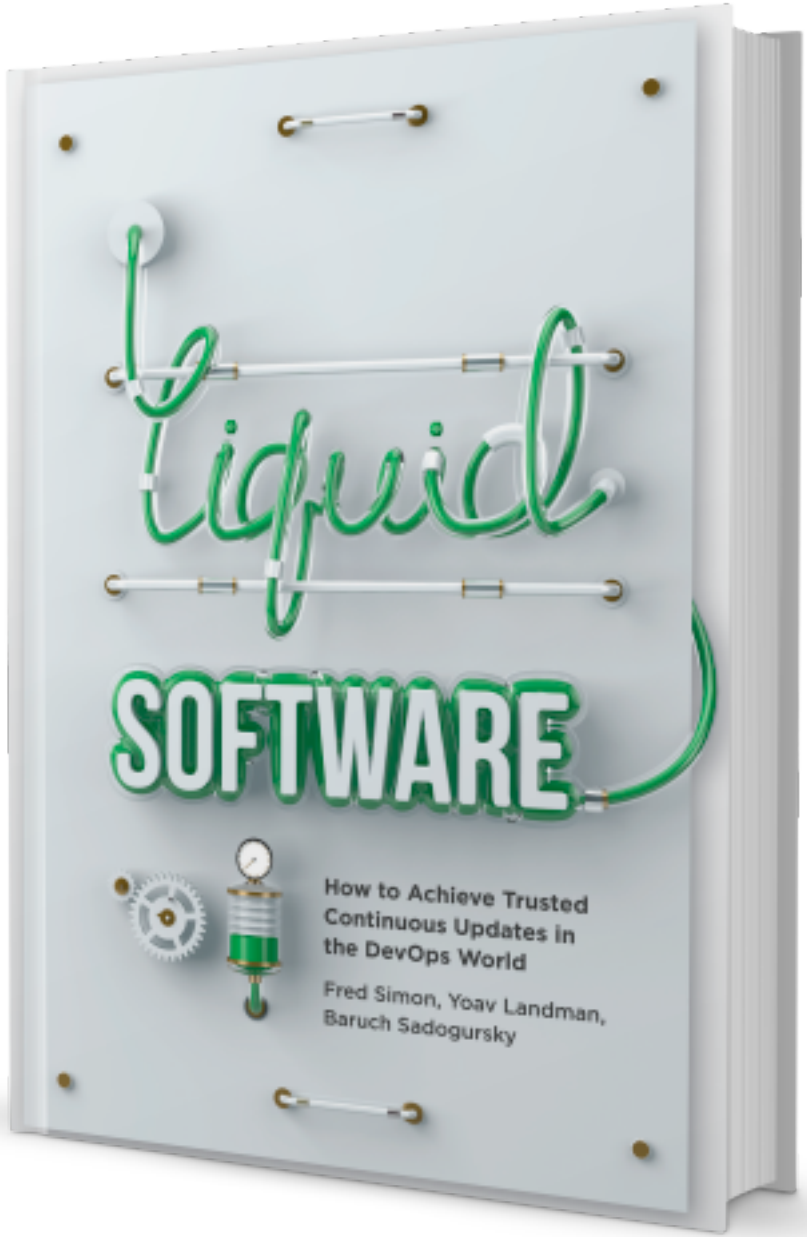
CONTINUOUS UPDATES

- Frequent
- Automatic
- Tested
- Progressively delivered
- State-aware
- Observability
- *Local Rollbacks


Update available
Do we want it?
Yes
Are there any high risks?
Yes
Do we trust the update?
Yes
Let's update!
No
Sure, why not? (auto update)

> *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.



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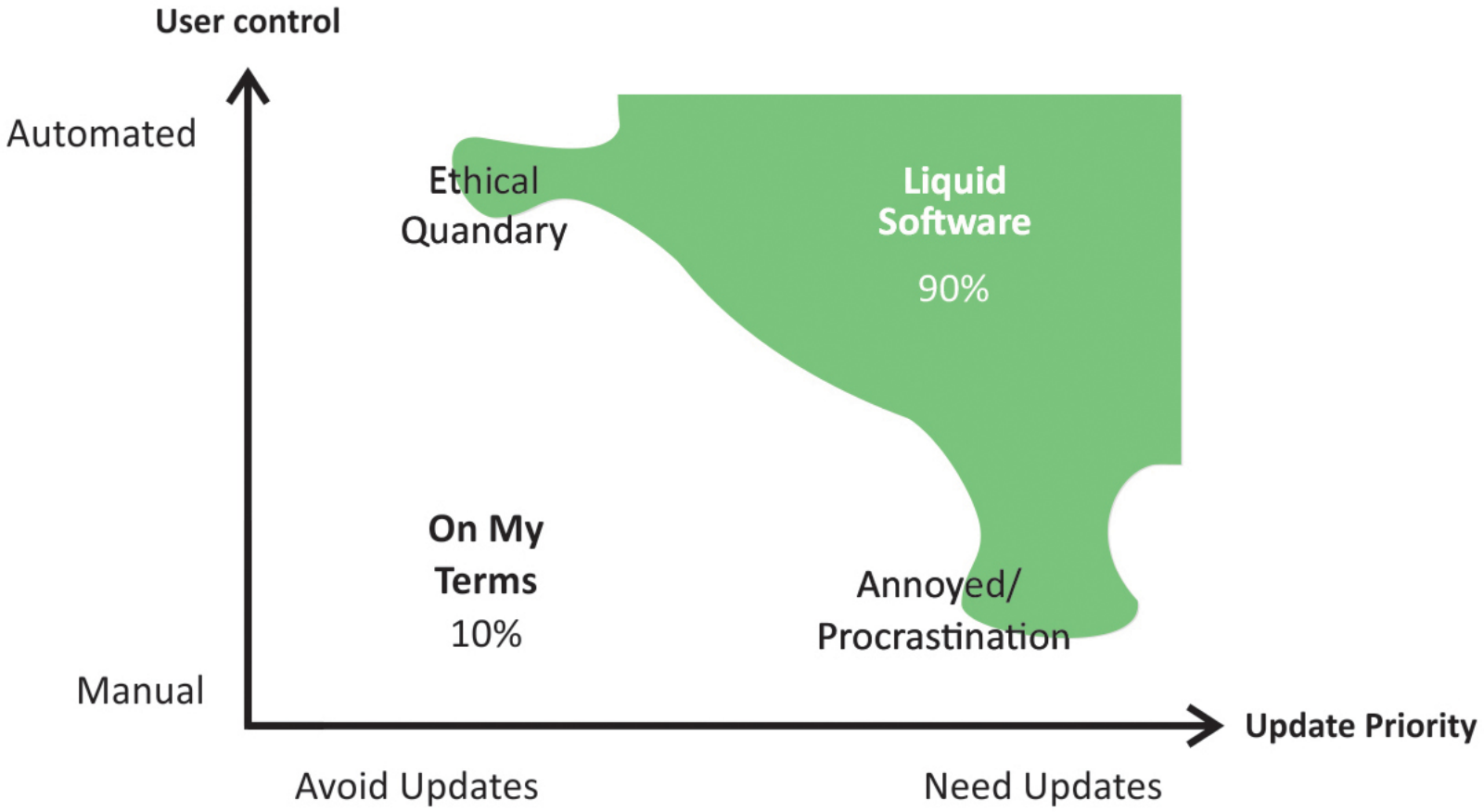
CORNER CASES?



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Software

Airbus A350 software bug forces airlines to turn planes off and on every 149 hours

Patch your darn metal bird, sighs EU aviation agency

By Gareth Corfield 25 Jul 2019 at 10:02 161 SHARE ▼

An Airbus promotional picture of an A350-1000. Its sister type, the A350-941, is the affected model of airliner

My first exposure to this was a story told to me by Gail Murphy, then my professor in a third-year software engineering course, about the production of the Boeing 787's predecessor, the 777. The 777 was Boeing's first "fly-by-wire" plane. In other words, the software had to work, as it was purely software that was controlling the flaps and rudder and preventing the plane from falling out of the sky. Gail recounted that, due to the criticality of the software, Boeing decided to put all the heads of software engineering on the test flight. During the test flight, the plane started shaking, and the software engineers were able to implement a midflight fix via the turbulence control software.[13] I have yet to find a better example of an organization putting software leaders' skin in the game of high-stakes product development.

The depth of Boeing's understanding of the business implications of

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