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.
```
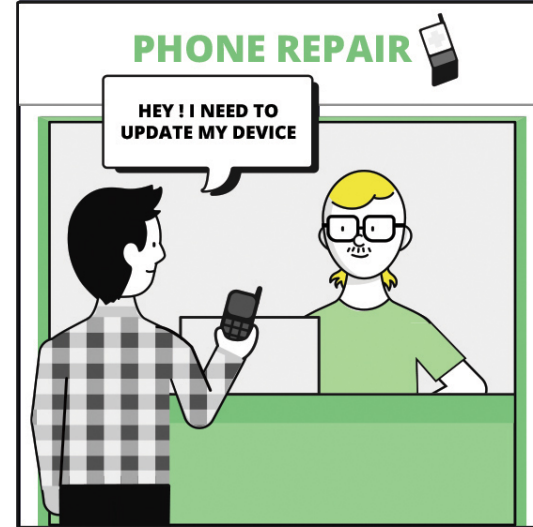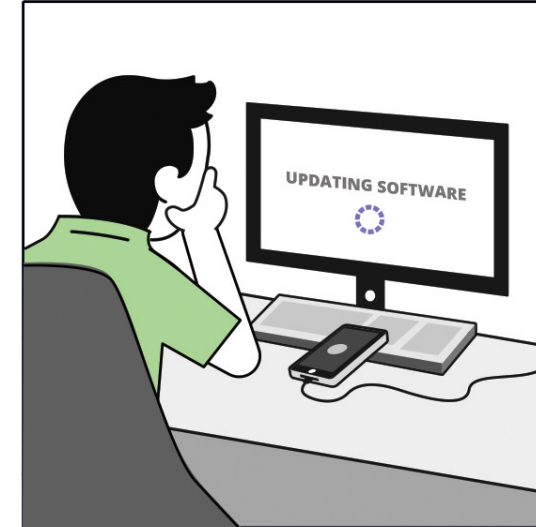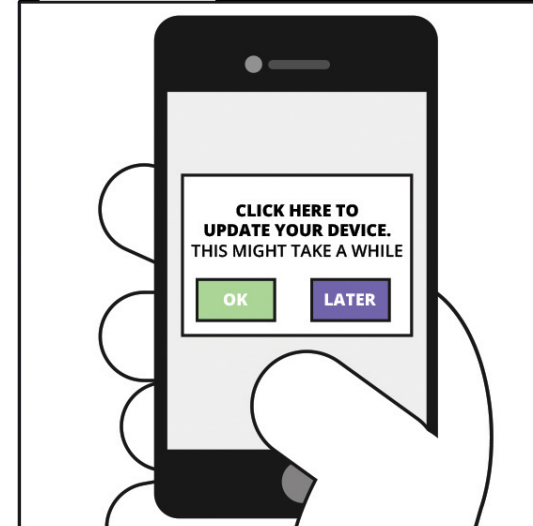
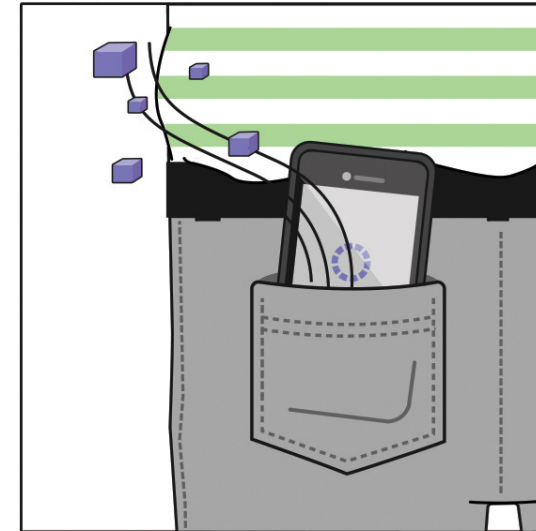"AS EVERY COMPANY BECOME A SOFTWARE COMPANY, SECURITY VULNERABILITIES ARE THE NEW OIL SPILLS"

@jbaruch   #LiquidSoftware   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

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

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**

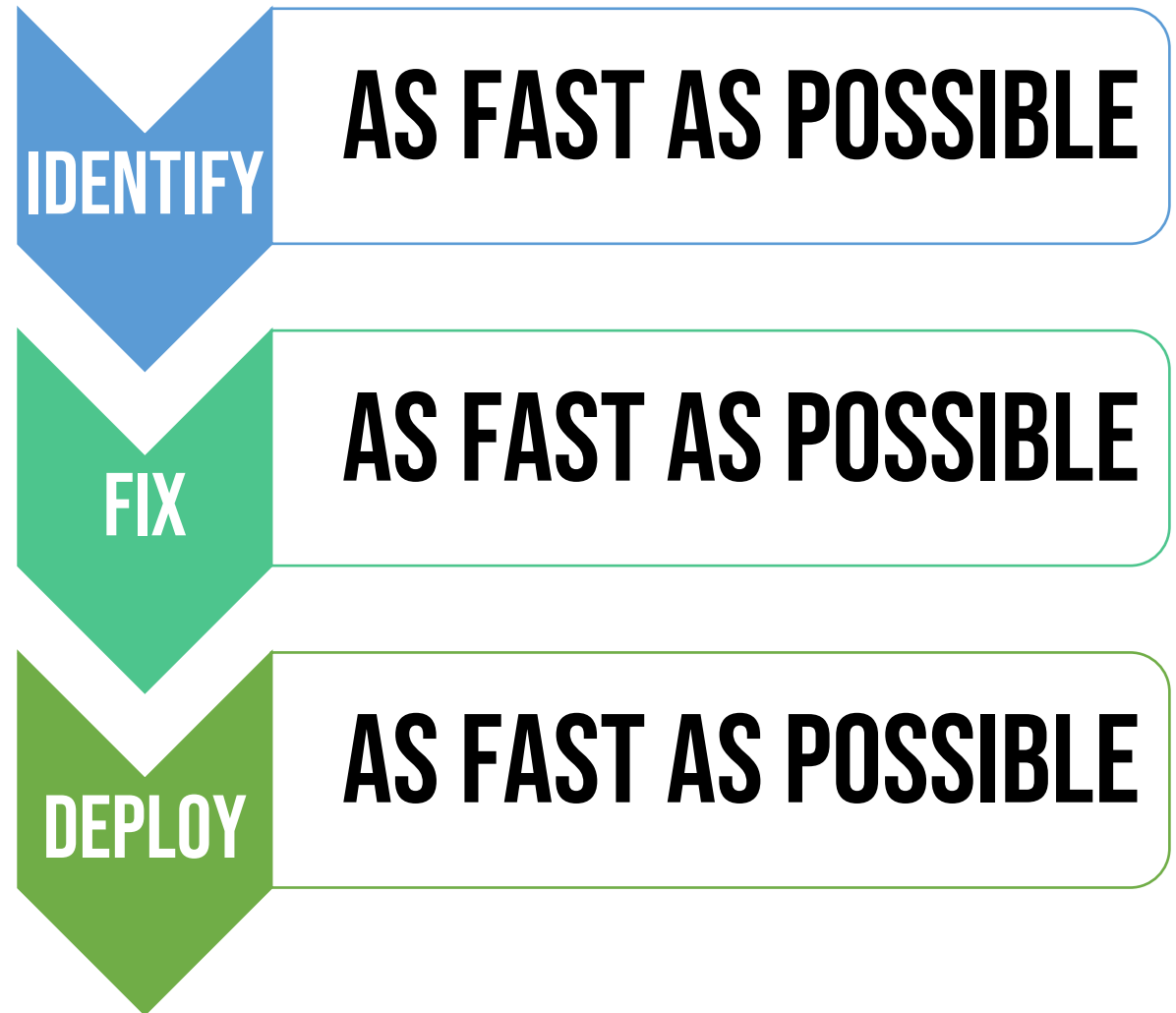Feb 25, 2019

IDENTIFY AS FAST AS POSSIBLE

FIX AS FAST AS POSSIBLE

DEPLOY AS FAST AS POSSIBLE

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

ACCELERATE

State of DevOps

2019

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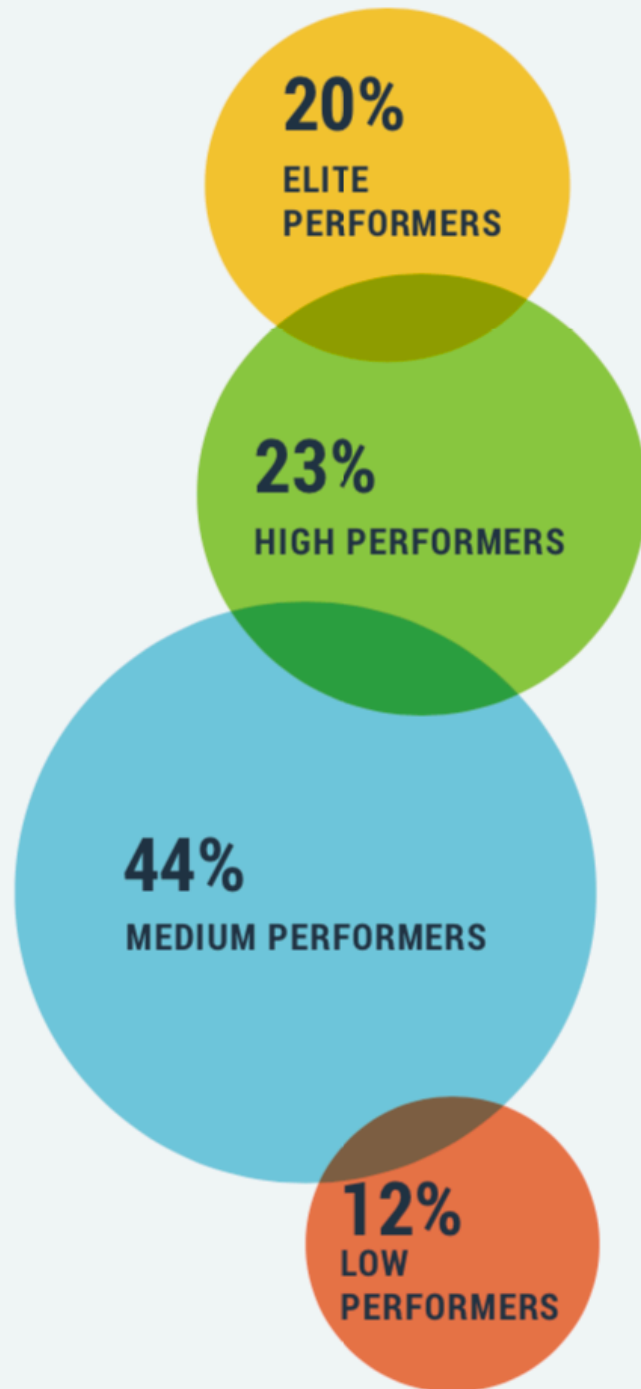
Aspect of Software Delivery Performance*	Elite
Deployment frequency For the primary application or service you work on, how often does your organization deploy code to production or release it to end users?	On-demand (multiple deploys per day)

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

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)

✉ JBARUCH@JFROG.COM

🐦 @JBARUCH

🎩 +1(408)890-9281

JFrog

EMOTIONALLY EXPRESSIVE

India

Russia

Israel

France

Spain

Italy

Brazil

Mexico

Saudi Arabia

Philippines

U.S.

CONFRONTATIONAL

AVOIDS CONFRONTATION

Netherlands

U.K.

Germany

Denmark

Sweden

Korea

Japan

EMOTIONALLY UNEXPRESSIVE

@ErinMeyerINSEAD's "Culture Map"

SHOWNOTES

□ http://jfrog.com/shownotes
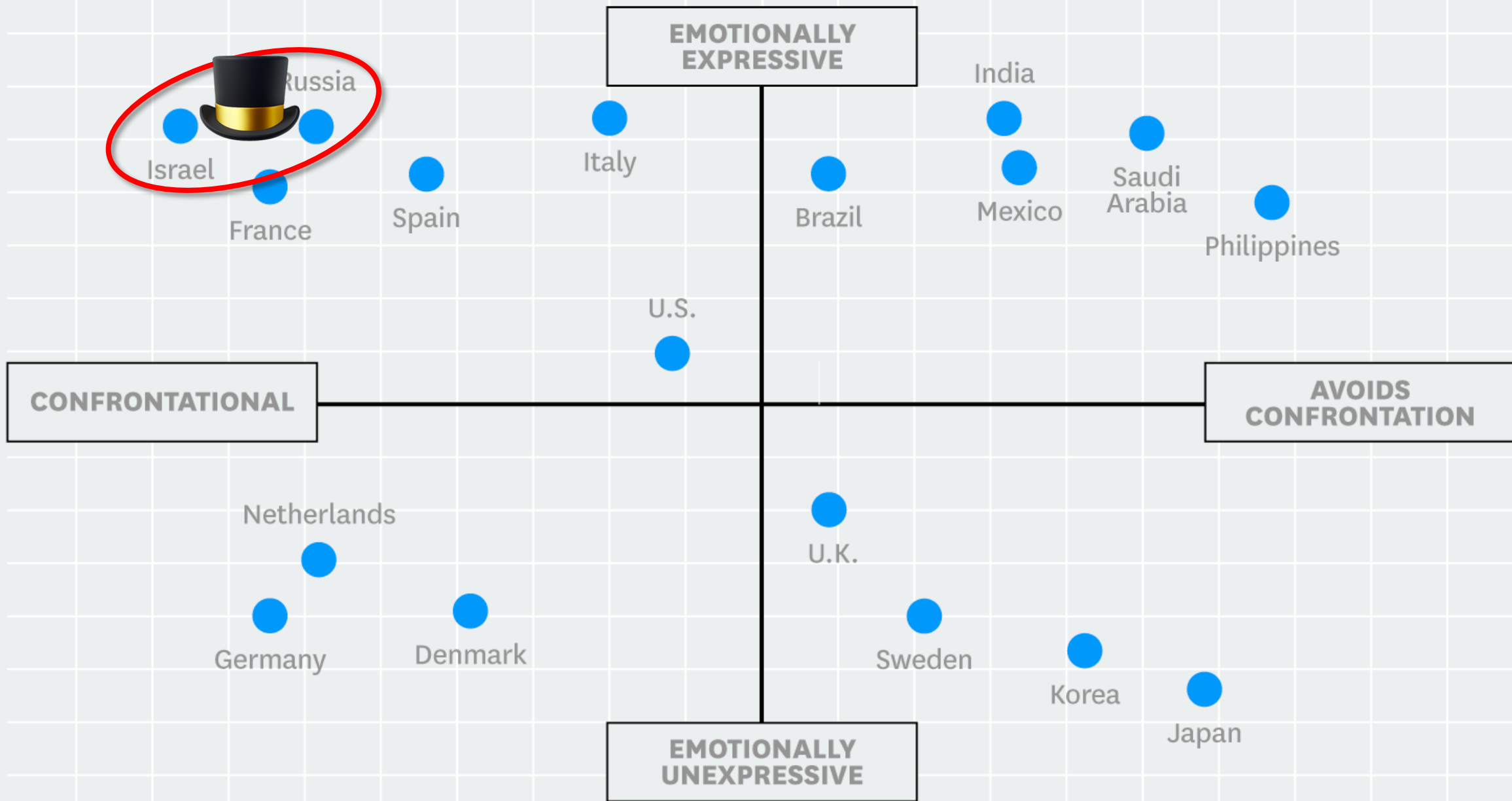
   □ Slides

   □ Video

   □ Links

   □ Comments, Ratings

   □ Raffle

SO, YOU WANTED TO UPDATE FASTER...

There's not a moment to lose!

Mark Reinhold

Moving Java Forward Faster

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

The State of Java: Trends And Data For One of the World's Most Popular Programming Languages

By Ben Evans • Mar. 13th, 2020 • Technology Industry

🏷 *Java, programming languages, trends*

...

Java 8 is still the standard—for now

Let's start with the one question Java developers are always curious about: Which versions are most used in production environments? Consider the following table:

Java version	% in use
14	0.00
13	0.32
12	0.17
11	11.11
10	0.48
9	0.18
8 Current	42.02
8 Lagging	38.63
8 Vulnerable	3.83
7	2.54
pre-7	0.73
Non-LTS	1.14

HOW DO WE UPDATE

@jbaruch   #LiquidSoftware   http://jfrog.com/shownotes
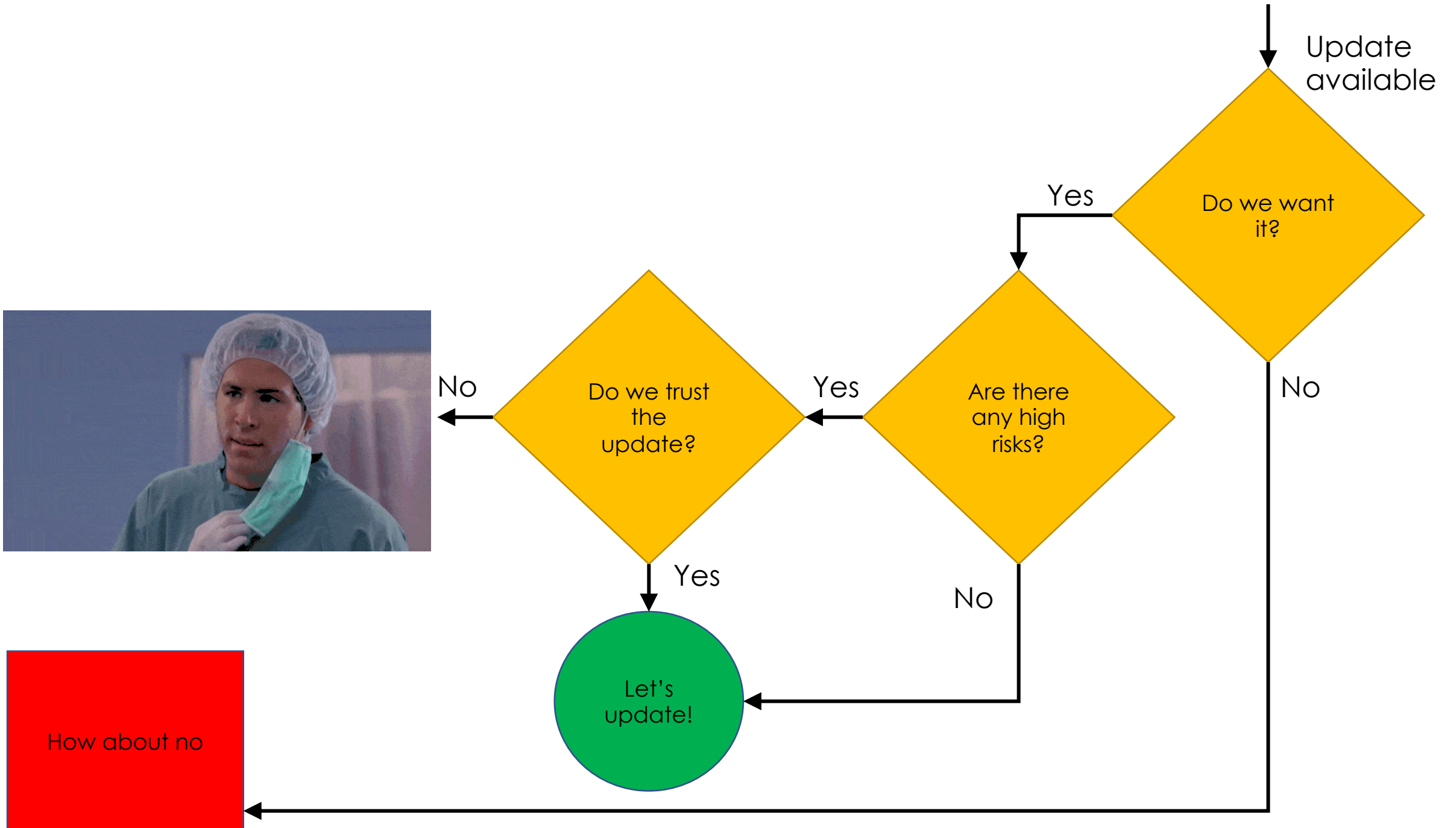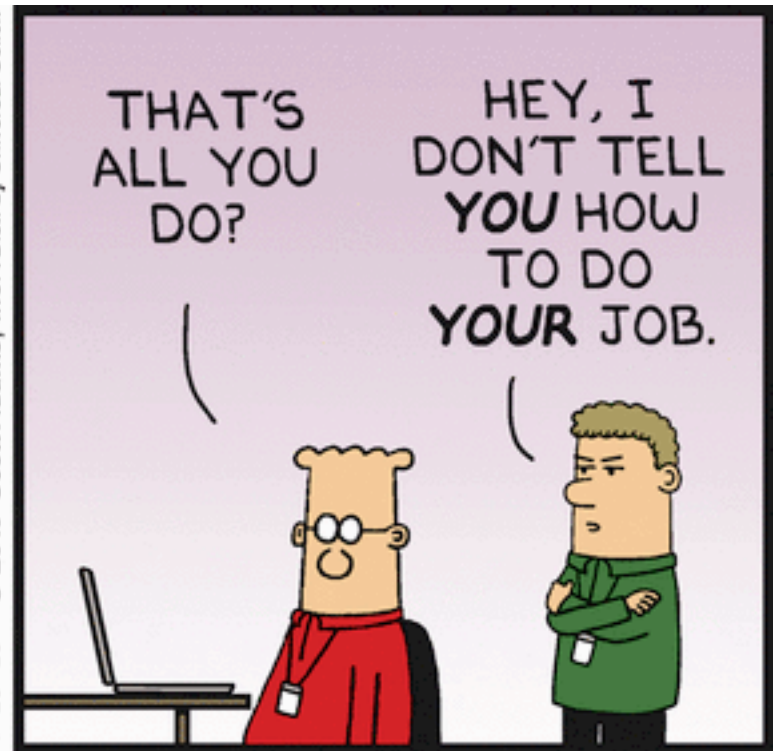
NUMBER OF ARTIFACTS AS A SYMPTOM OF COMPLEXITY

Today

2000

IoT

Serverless

Docker

Microservices

Infrastructure as Code

Continuous Delivery

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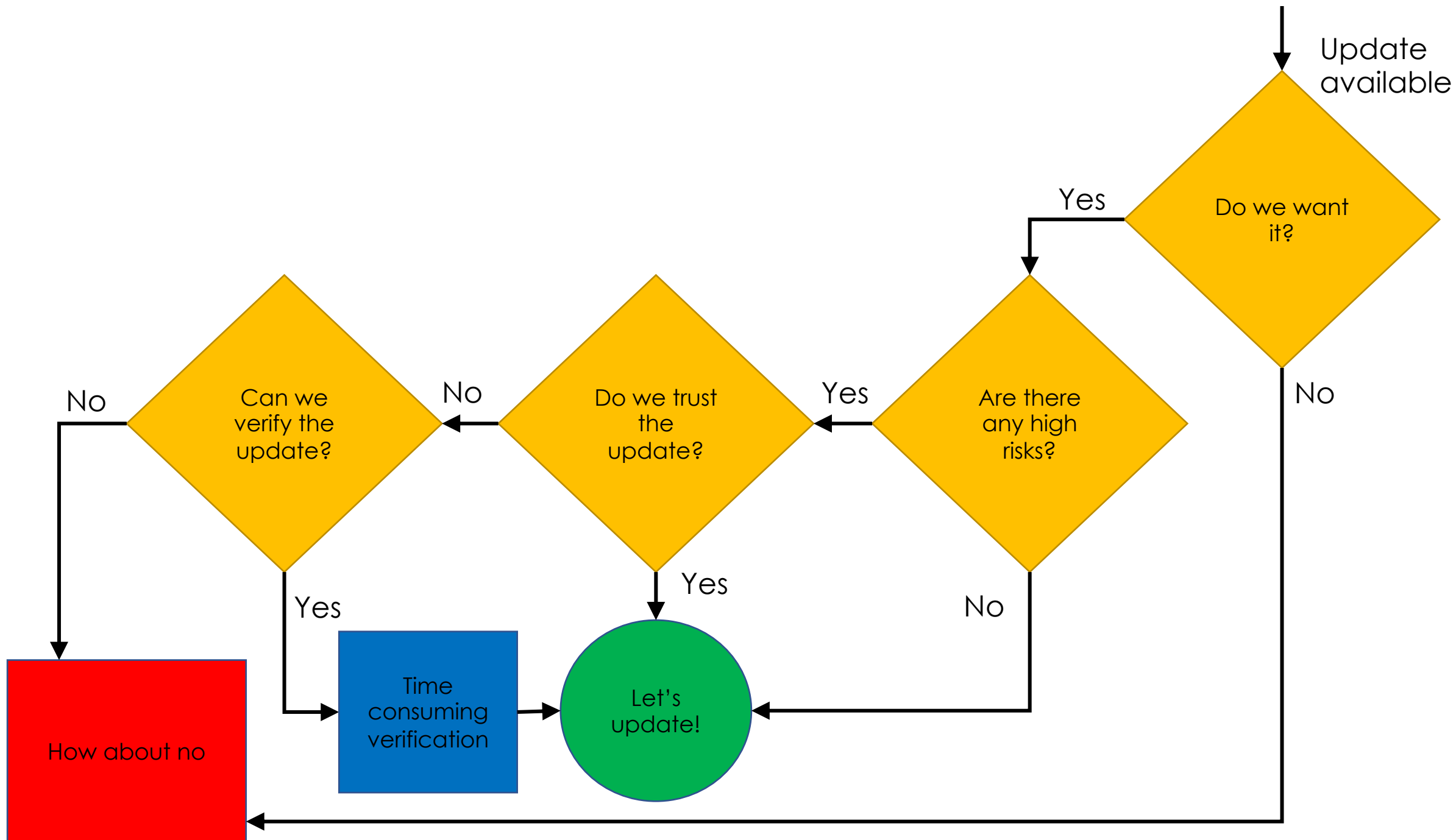
Agile
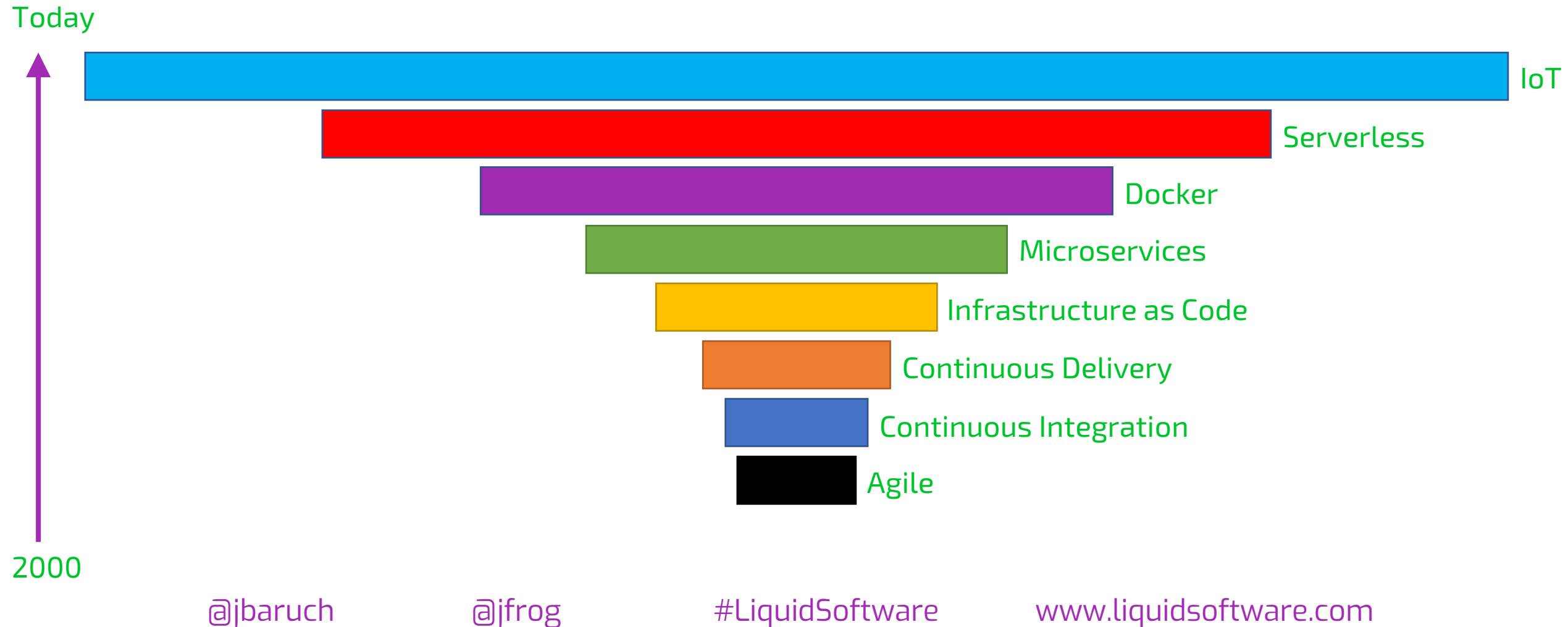
THE PROBLEM IS NOT THE CODE, IT'S THE DATA. BIG DATA.

Annual Size of the Global Datasphere

175 ZB
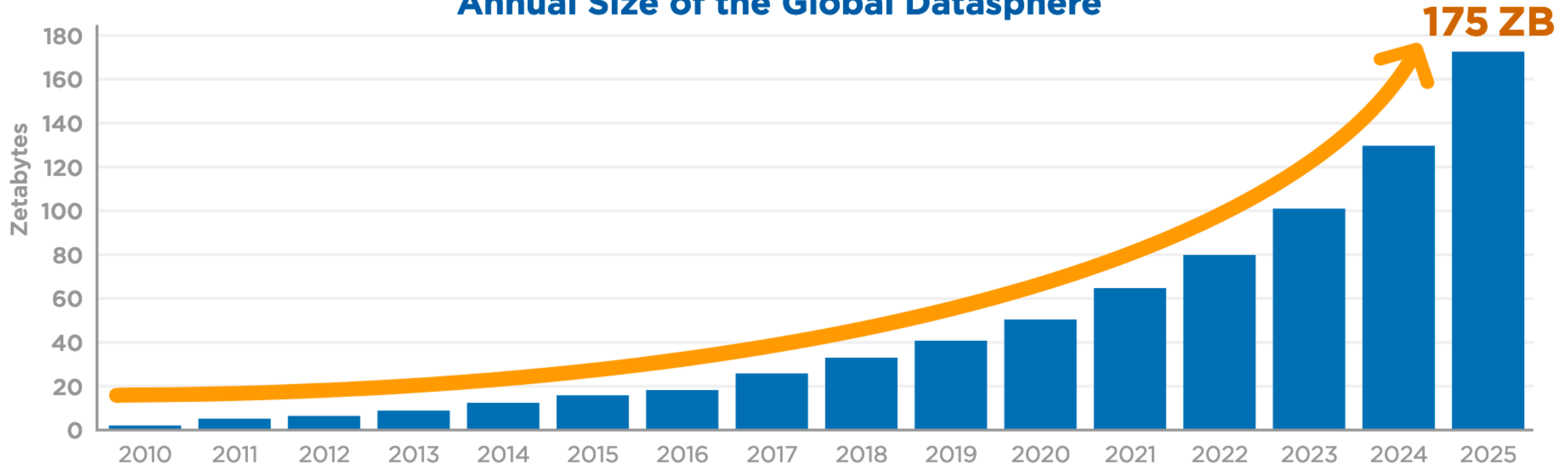
Source: Data Age 2025, sponsored by Seagate with data from IDC Global DataSphere, Nov 2018

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

Features that we want

Acceptance tests costs

WHAT CAN POSSIBLY GO WRONG?
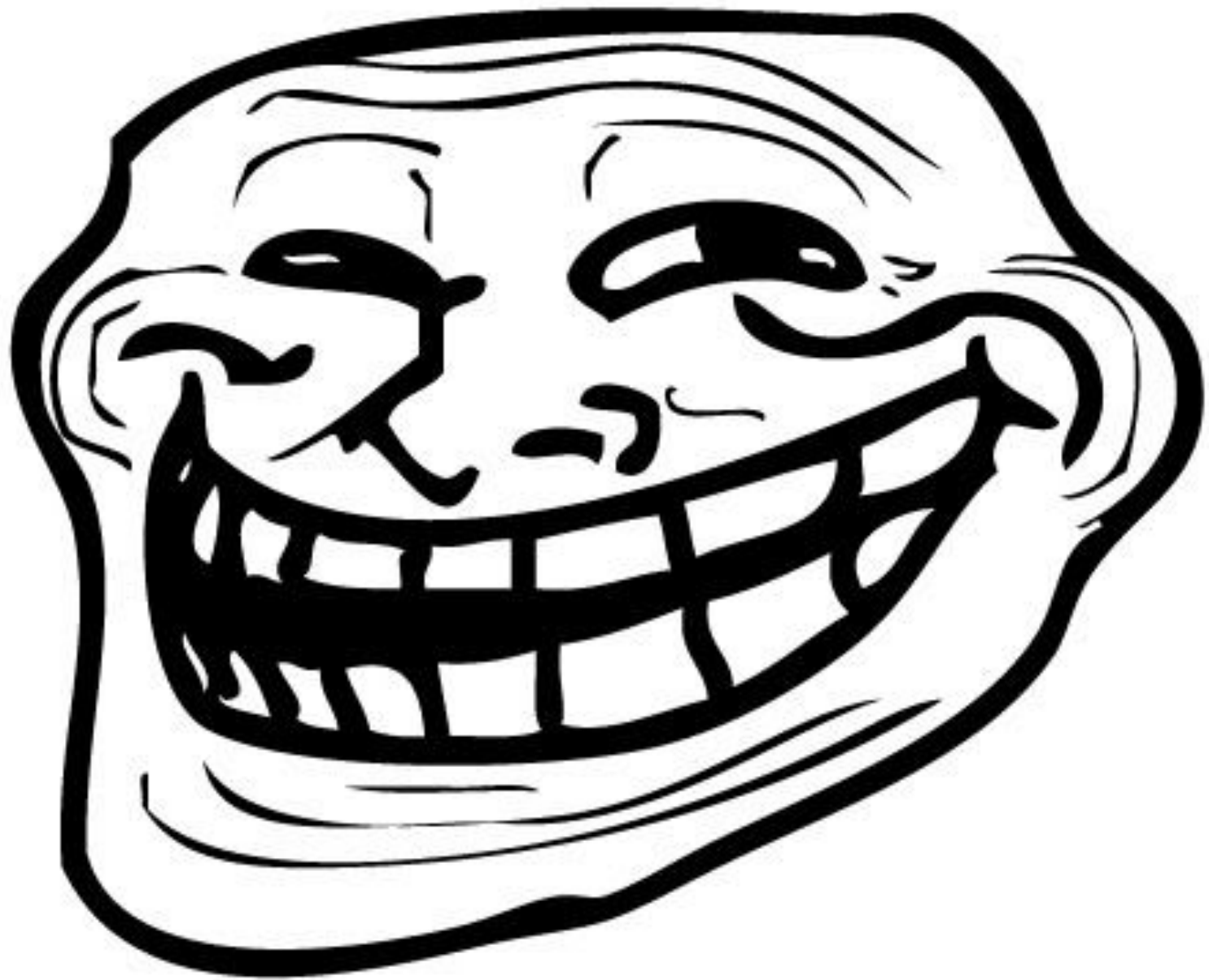
OnHub

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   #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.
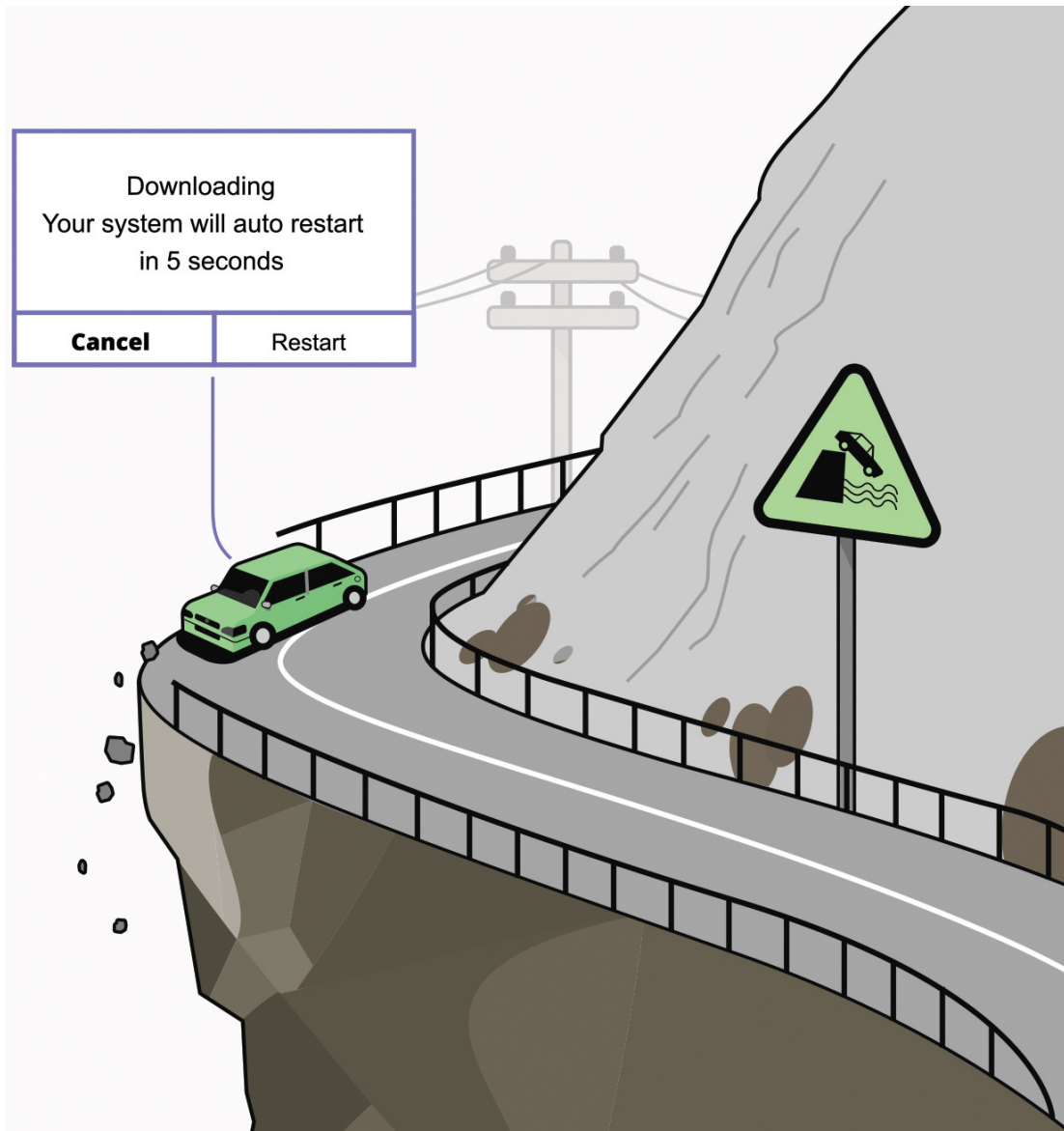
Ben Brown On behalf of the Google Wifi and OnHub team

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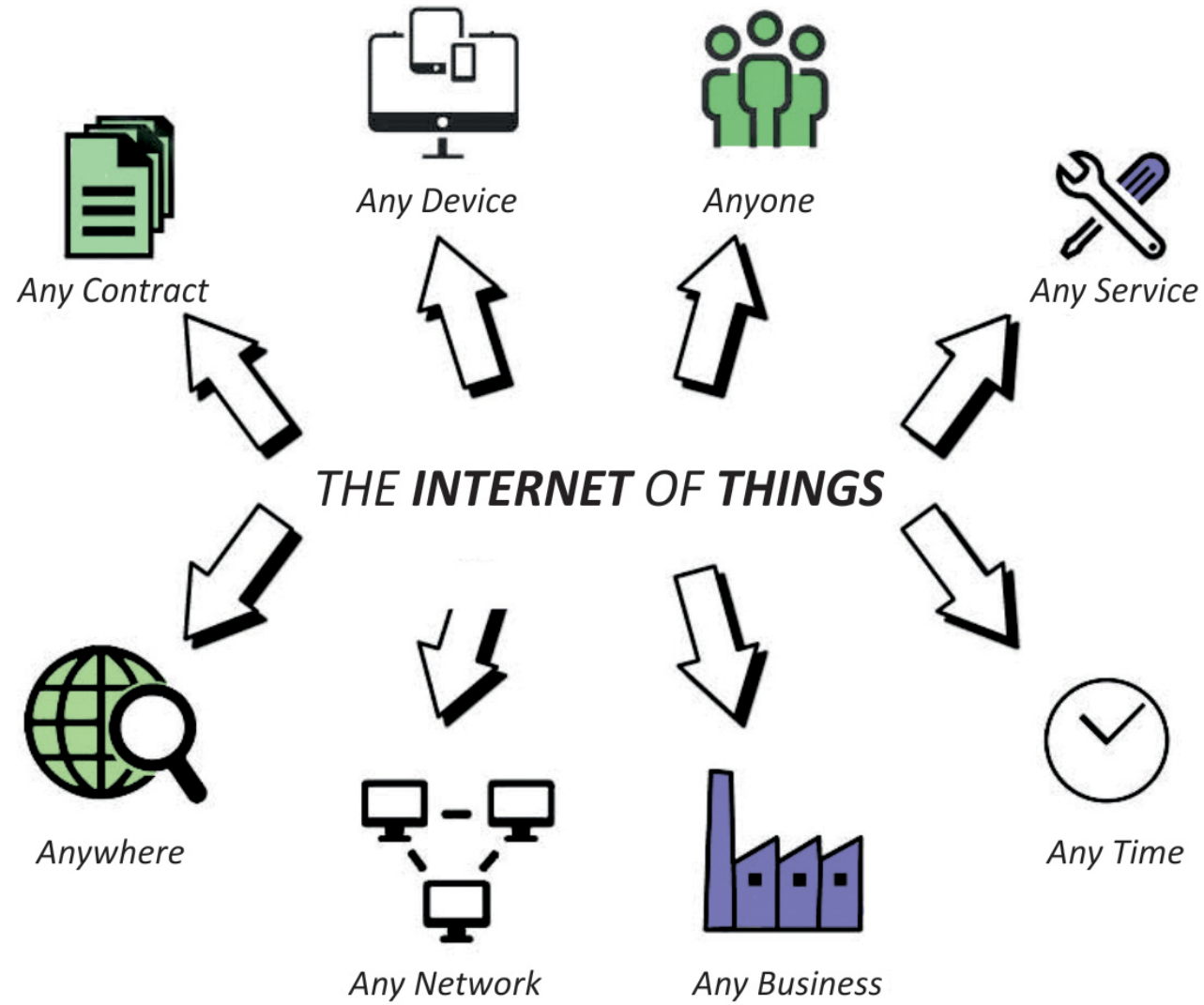
Jaguar I-PACE Recalled, Needs Software Update To Fix Regenerative Brakes

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. 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.
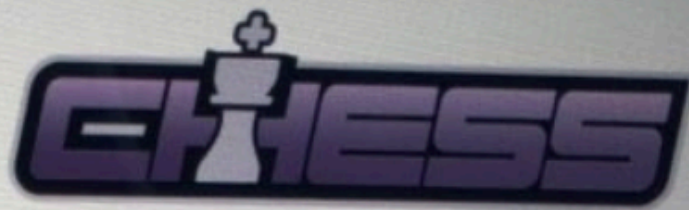
💬 79 Comments   ⭐ Give Award   ➤ Share   🔖 Save   ⊘ Hide   🚩 Report

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.

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	✓	✗

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.

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.

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

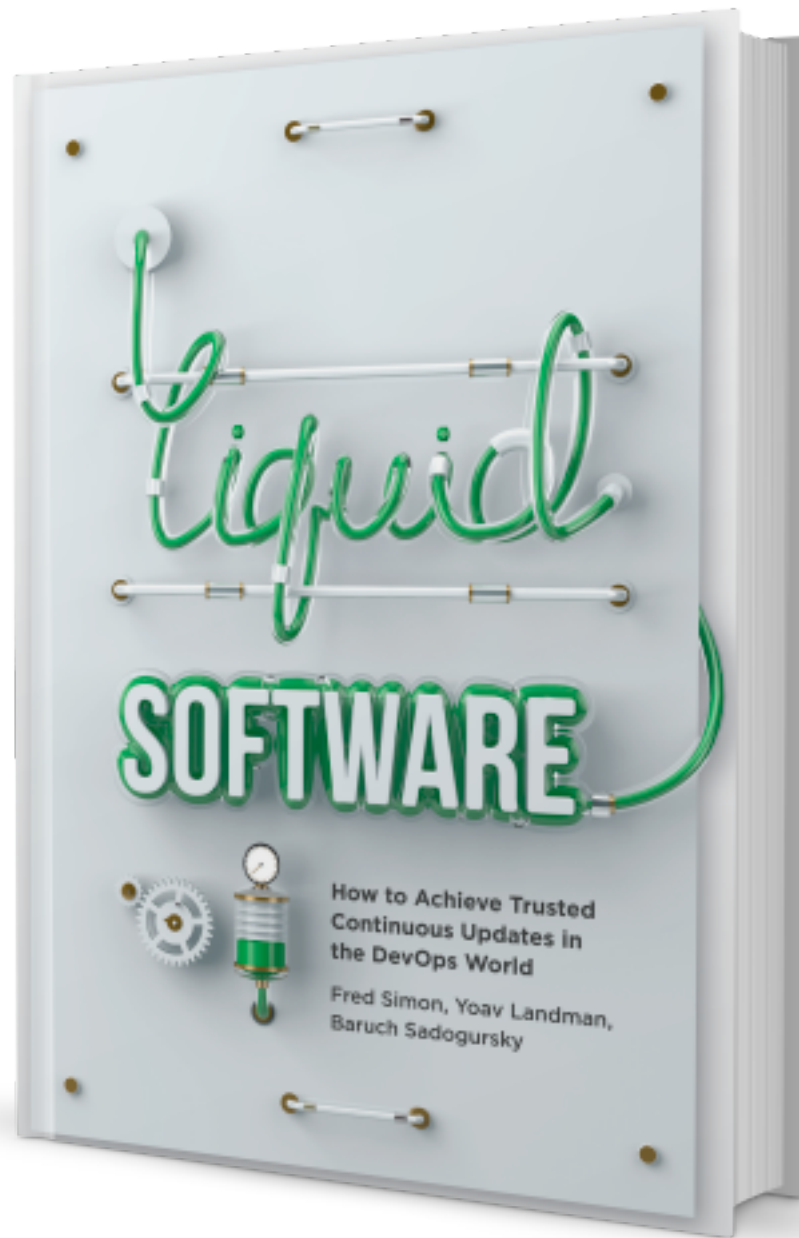☐ Solution: Implement rollback, the ability to deploy a previous version without delay

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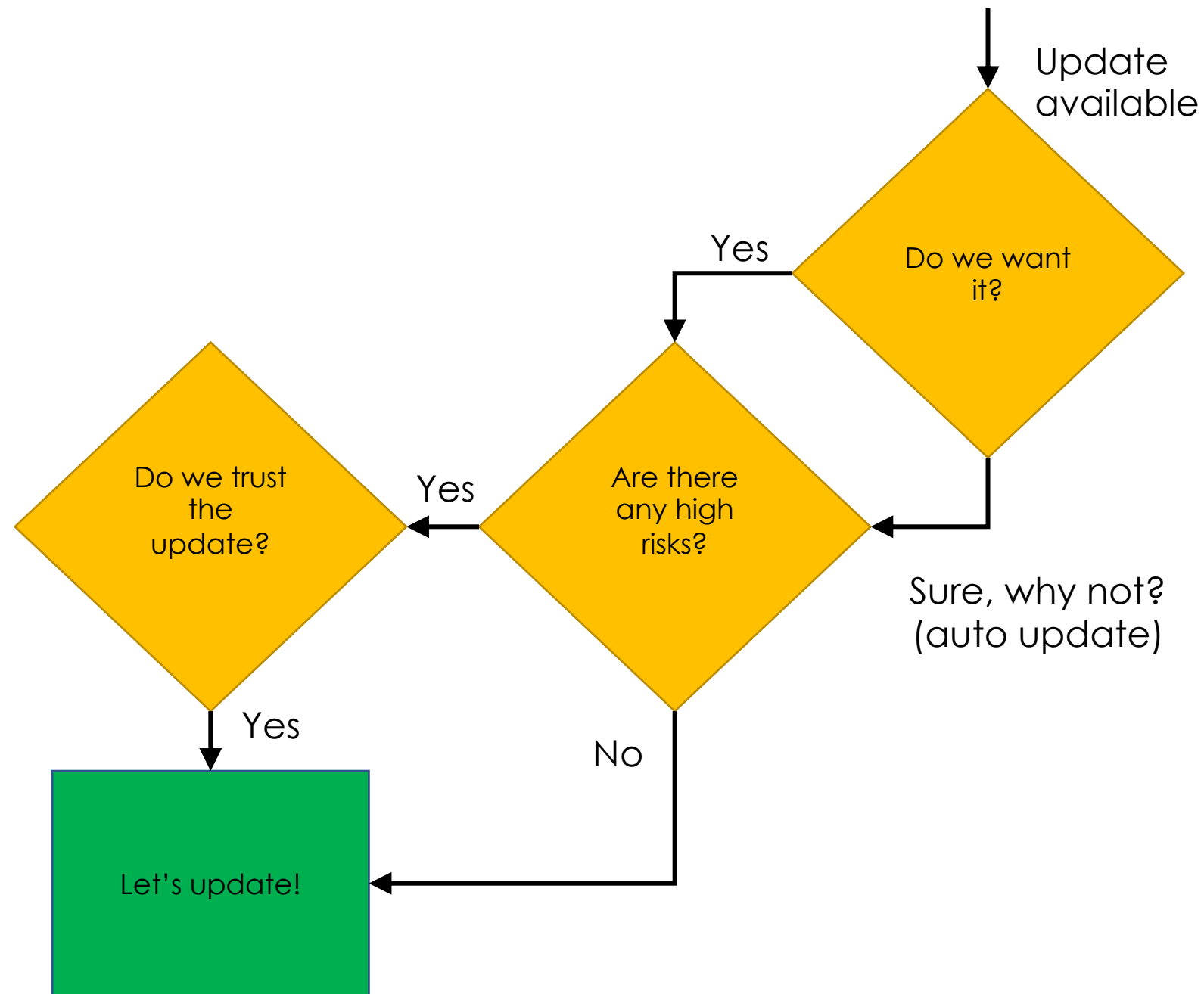
" *Our goal is to transition from bulk and rare software updates to extremely tiny and extremely frequent software updates;*

so tiny and so frequent that they provide an illusion of software flowing from development to the update target.

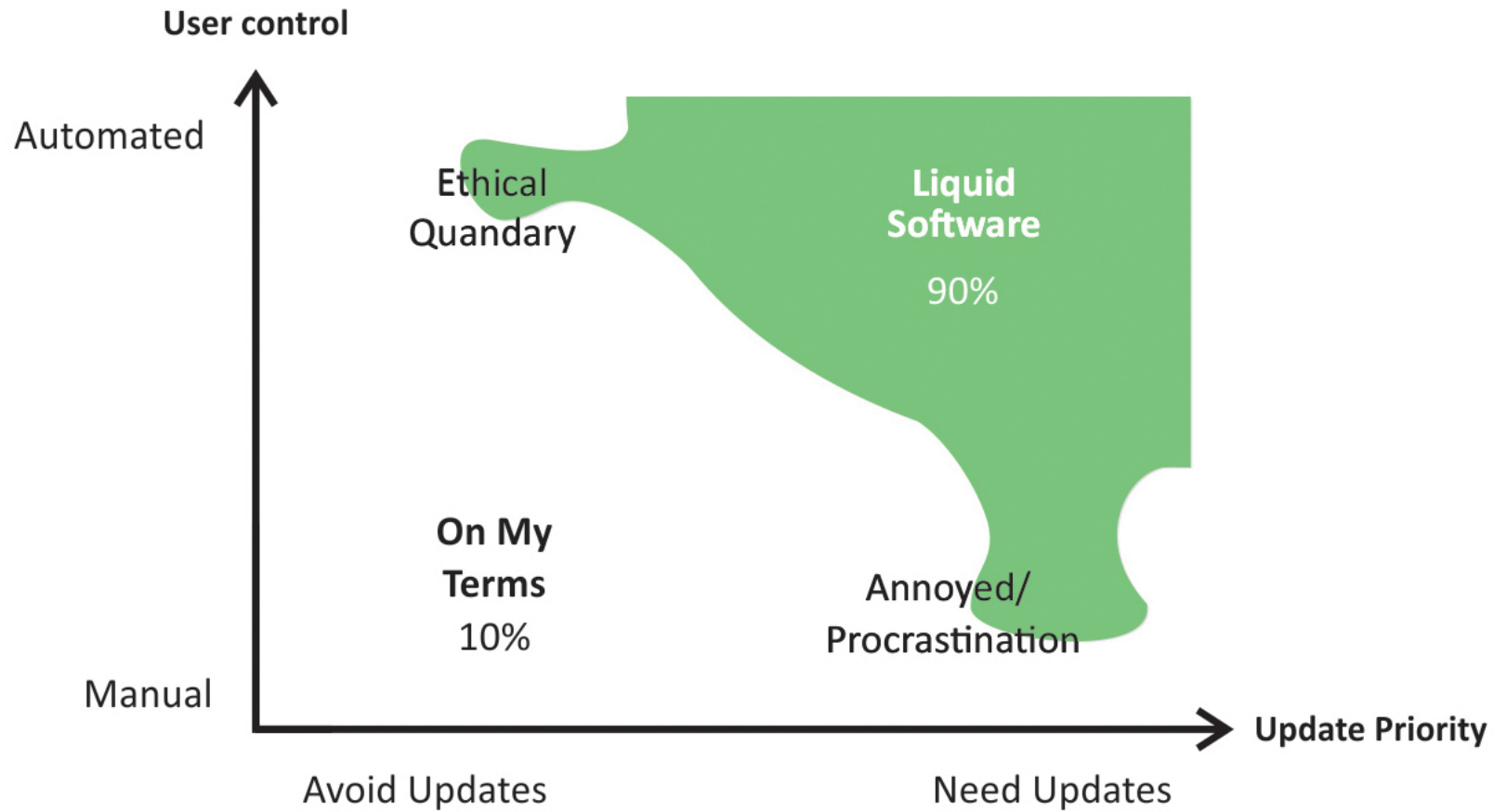**We call it the Liquid Software vision.**

Liquid
SOFTWARE

How to Achieve Trusted
Continuous Updates in
the DevOps World

Fred Simon, Yoav Landman,
Baruch Sadogursky

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

CORNER CASES?

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

{* SOFTWARE *}

Boeing 787s must be turned off and on every 51 days to prevent 'misleading data' being shown to pilots

US air safety bods call it 'potentially catastrophic' if reboot directive not implemented

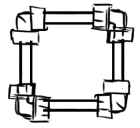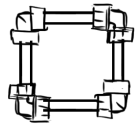By Gareth Corfield 2 Apr 2020 at 14:45   158 💬   SHARE ▼

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.
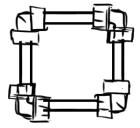
The depth of Boeing's understanding of the business implications of
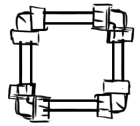
Q&A AND TWITTER ADS

@jbaruch

#LiquidSoftware

https://liquidsoftware.com

https://jfrog.com/shownotes