

Mature microservices and how to operate them

Sarah Wells

Technical Director for Operations & Reliability, The Financial Times

@sarahjwells



Sorry

The page you are trying to access does not exist.

This might be because you have entered the web address incorrectly or the page has moved.

For help please visit help.ft.com.

We apologise for any inconvenience.

Why wasn't this page found?

We asked some leading economists.

Stagflation

The cost of pages rose drastically, while the page production rate slowed down.

General economics

There was no market for it.

Liquidity traps

Monetarism

The government has limited the number of pages in circulation.

Efficient Markets Hypothesis

If you had paid enough for the page, it would have appeared.

Moral Hazard

Showing you this page would only encourage you to want more

<https://www.ft.com/stream/>

c47f4dfc-6879-4e95-accf-ca8cbe6a1f69

<https://www.ft.com/companies>

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FT

Problem: we'd set up a redirect to a page which didn't exist

We weren't sure how to fix the data
via the url management tool

6:59 PM

How does one access the dynamoDb table? I've had a look into heroku customer products and see no app running there...

[2 replies](#) Last reply 2 months ago

7:26 PM

I've never rolled back the database, it isn't using the inbuilt dynamo backups afair, it's static dumps to S3? Or am I out of date?

[7 replies](#) Last reply 2 months ago

7:09 PM

I think we should use the URL Management tool to point /APM back at the home page, which should then fix all of the other redirects affected. We can then set up the segment -> APM link anew?

7:30 PM

Is the best plan

- a) use the URL Management tool to point /APM back at the home page and then if that fails
- b) rolling back to a backup from 14:58 today or



We got it fixed

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Polyglot architectures are great -
until you need to work out how
this database is backed up



US-China trade dispute
Trump calls on China to drop levies on US farm products

President says his request is justified by progress in trade talks



Space industry
SpaceX launch edges Musk closer to taking humans into space

Rocket carrying company's Crew Dragon craft embarks on dry run for carrying astronauts



FTfm
Canadian cannabis fund returns 50% in two months

Horizons Marijuana Life Sciences Index set to be country's second most profitable ETF



Banks
Wanted: old bank chief for merger

A boss who is ready to retire makes a lender easier to sell



The Big Read

Jonathan Derbyshire

Save us from distracted phone zombies

Chinese city decides to force behavioural

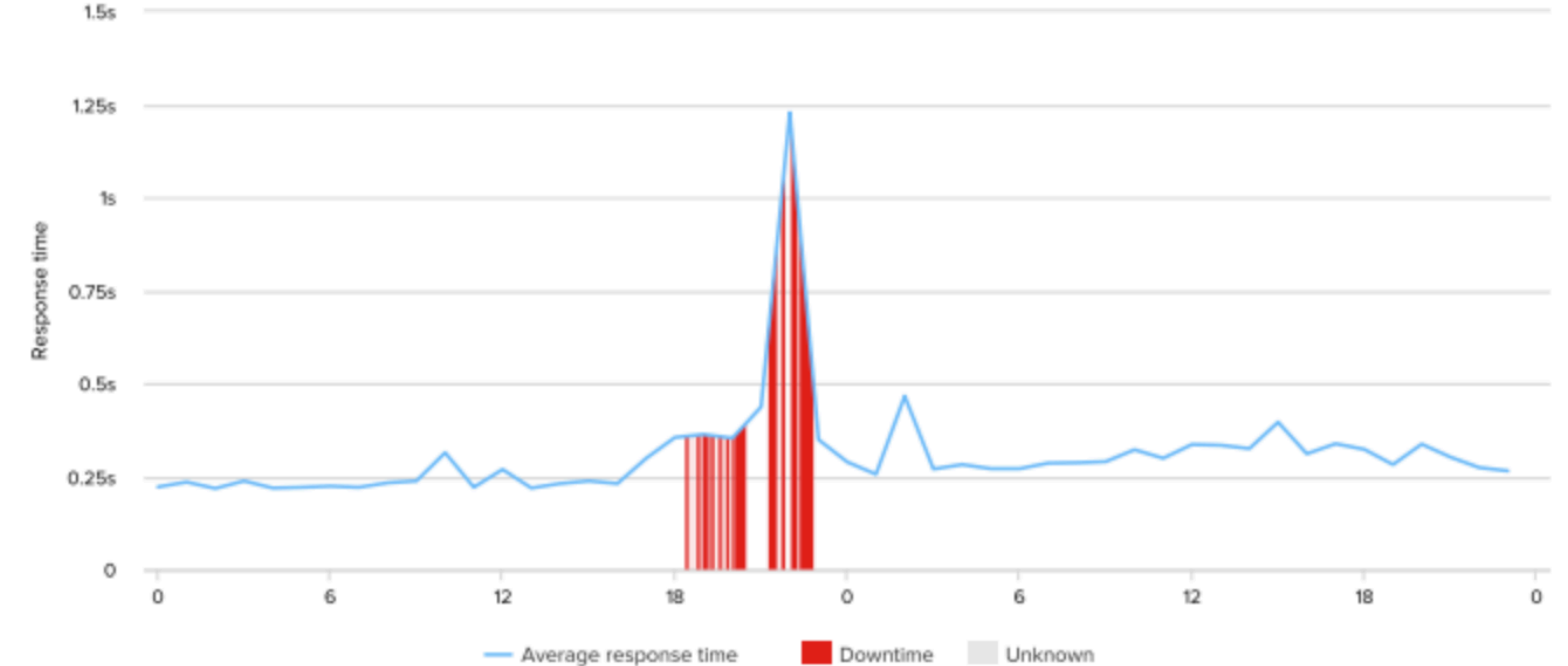
FTfm

New York and Boston lose fund industry jobs to cheaper cities

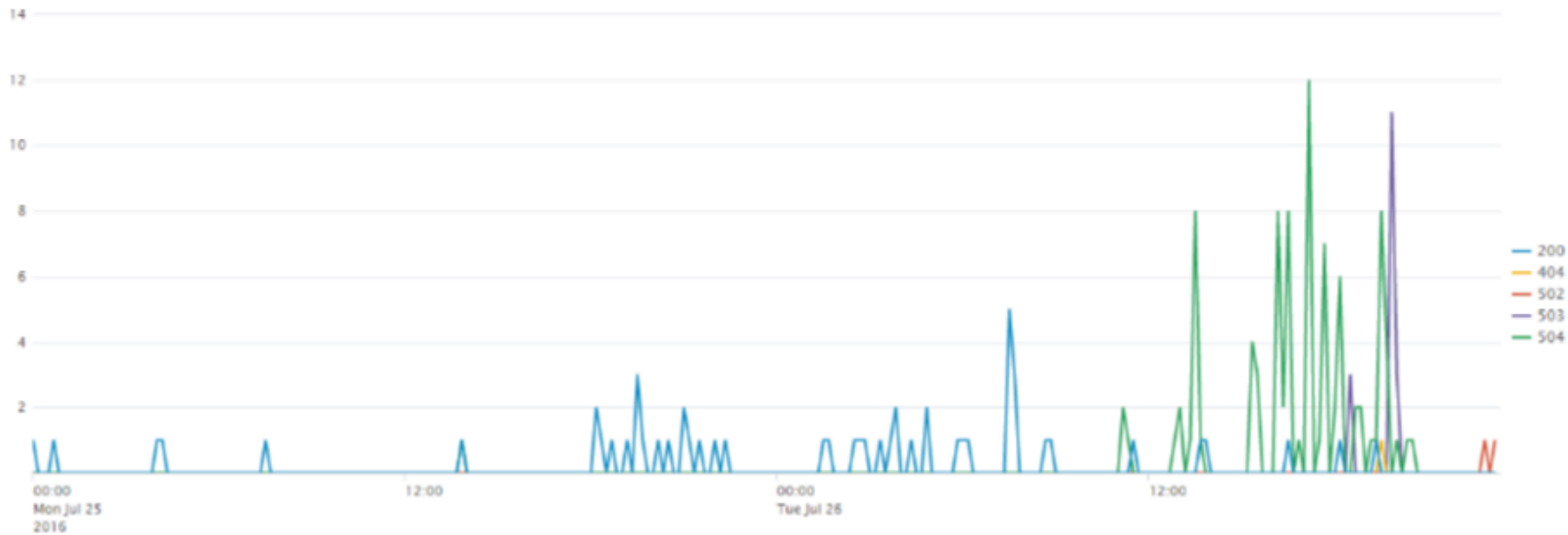
Cost of living and quality of life count

Response time

Downtime	Outages	Uptime	Max resp. time	Min resp. time	Avg resp. time
1h51m	21	96.15%	1.23s	218ms	302ms



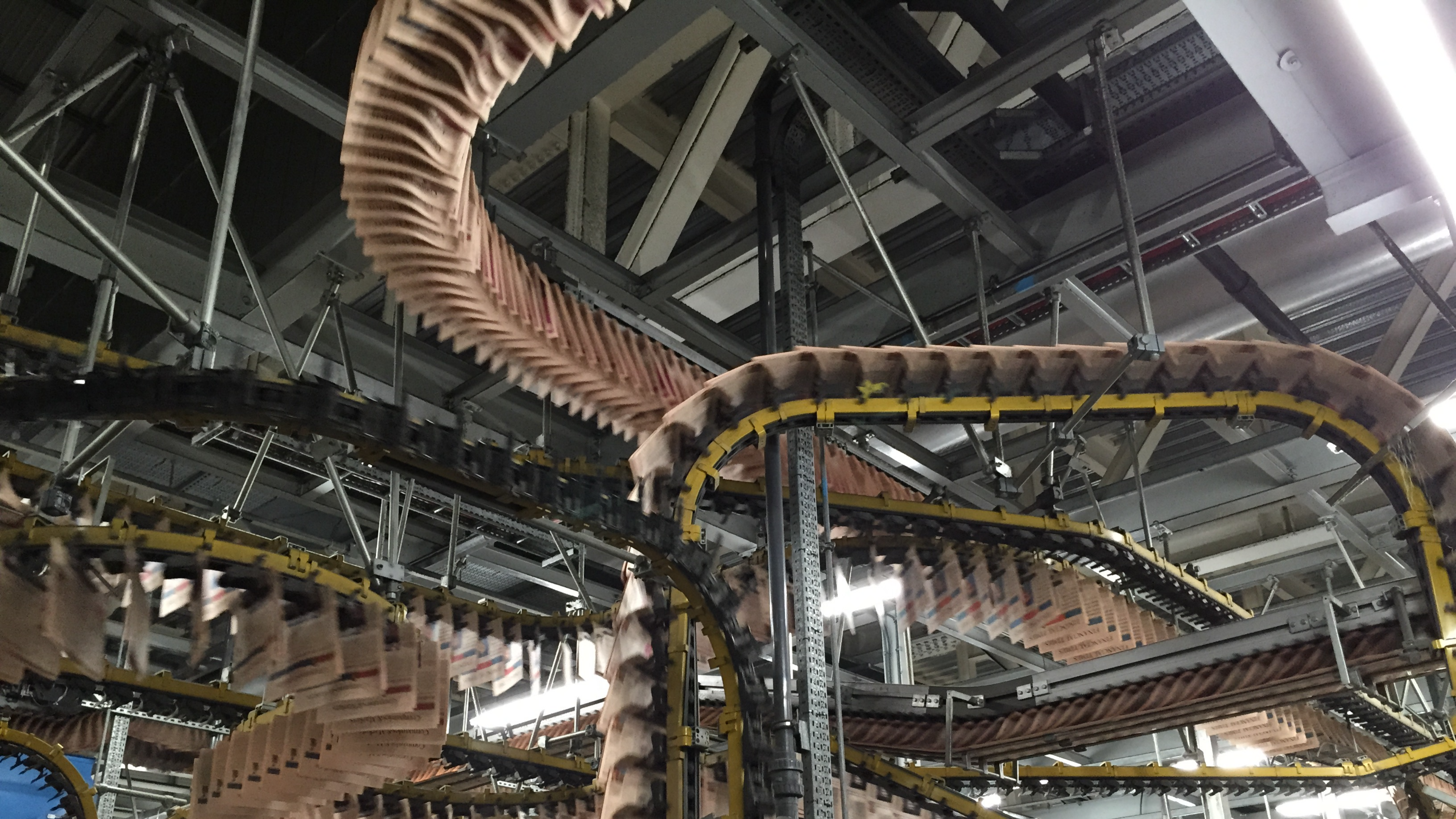
Line Format



Microservices are more
complicated to operate and
maintain

Why bother?

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Lyft Inc

Lyft reveals \$2bn revenues as it races to IPO

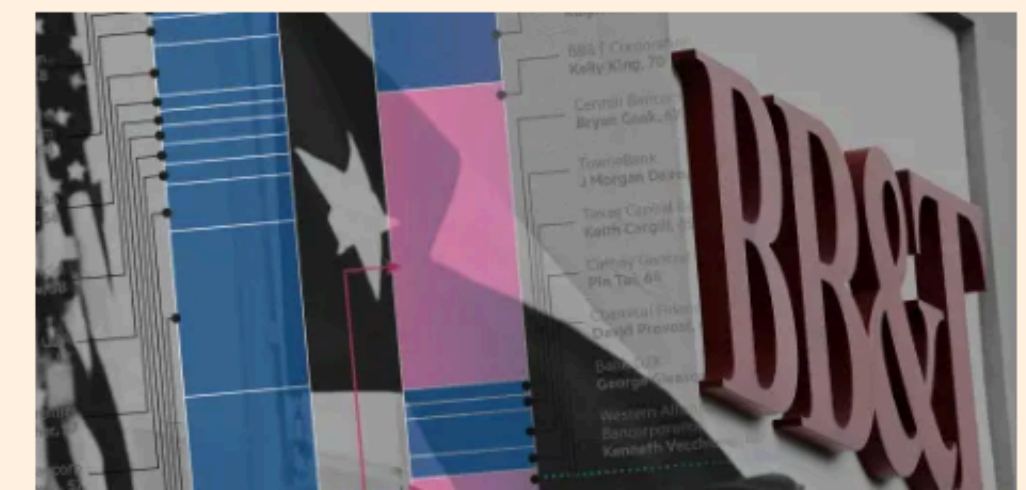
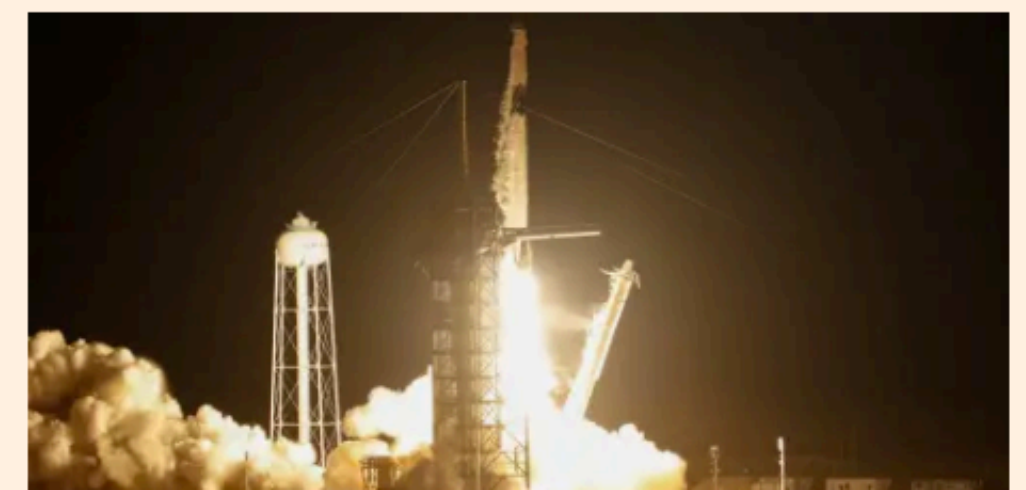
Car-booking app beats rival Uber to market in big year for tech listings

- Lyft unveils plan for initial public offering
- Uber/Lyft: drive time
- Uber and Lyft to offer shares to drivers as part of IPOs



Weekend long reads

The beginner’s guide to buying a private island



“Experiment” for most
organizations really means “try”

Linda Rising
Experiments: the Good, the Bad and the Beautiful

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Releasing changes frequently
doesn't just 'happen'

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Done right, microservices enable
this

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The team that builds the system
has to operate it too

What happens when teams move on to new projects?

Your next legacy system will be
microservices not a monolith

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Optimising for speed

Operating microservices

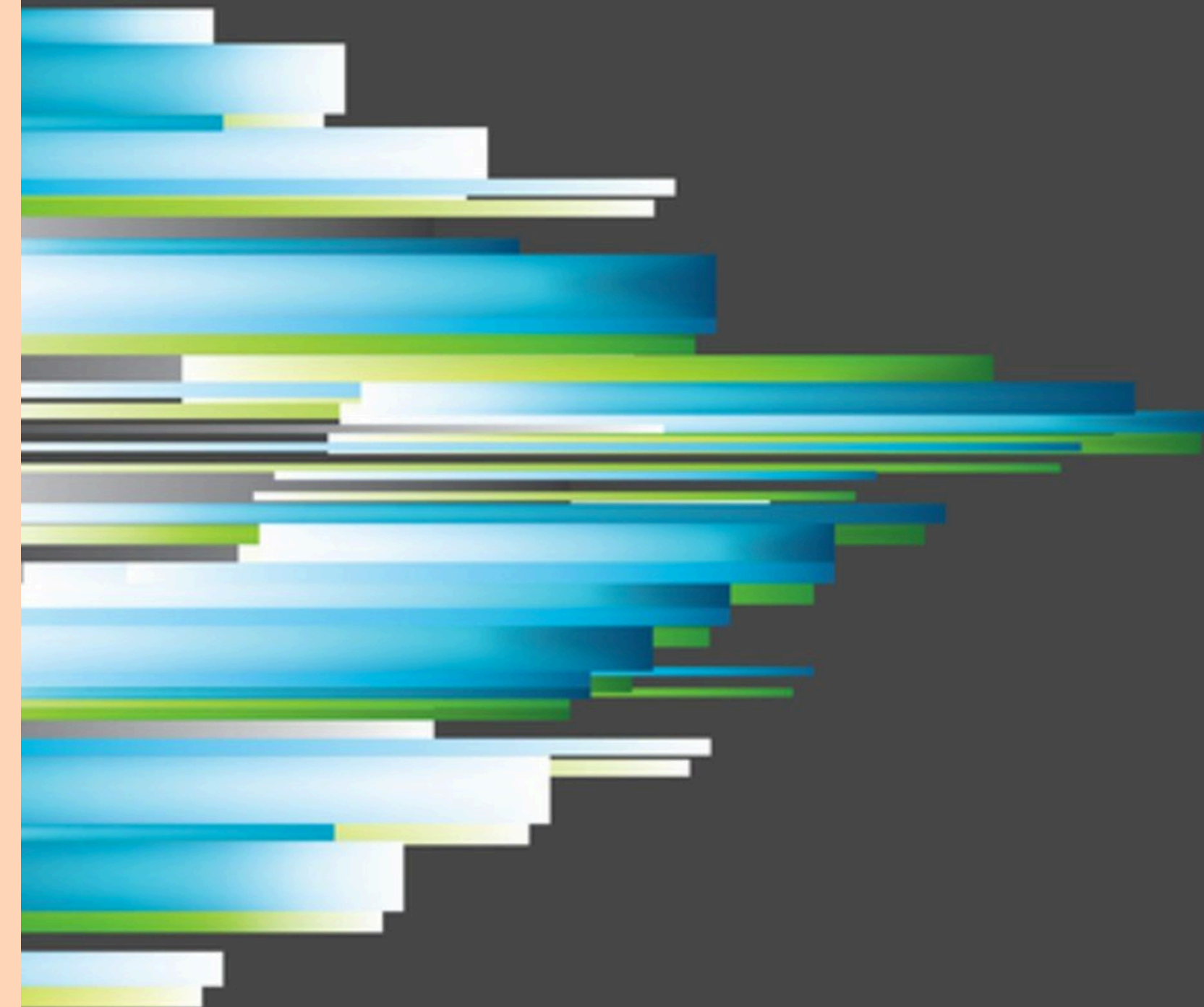
When people move on

Optimising for speed

THE SCIENCE OF DEVOPS

ACCELERATE

Building and Scaling High Performing
Technology Organizations



Nicole Forsgren, PhD
Jez Humble *and* Gene Kim

Measure	High performers
Delivery lead time	

Measure	High performers
Delivery lead time	Less than one hour

“How long would it take you to release a single line of code to production?”

Measure	High performers
Delivery lead time	Less than one hour
Deployment frequency	

Measure	High performers
Delivery lead time	Less than one hour
Deployment frequency	On demand

Measure	High performers
Delivery lead time	Less than one hour
Deployment frequency	On demand
Time to restore service	

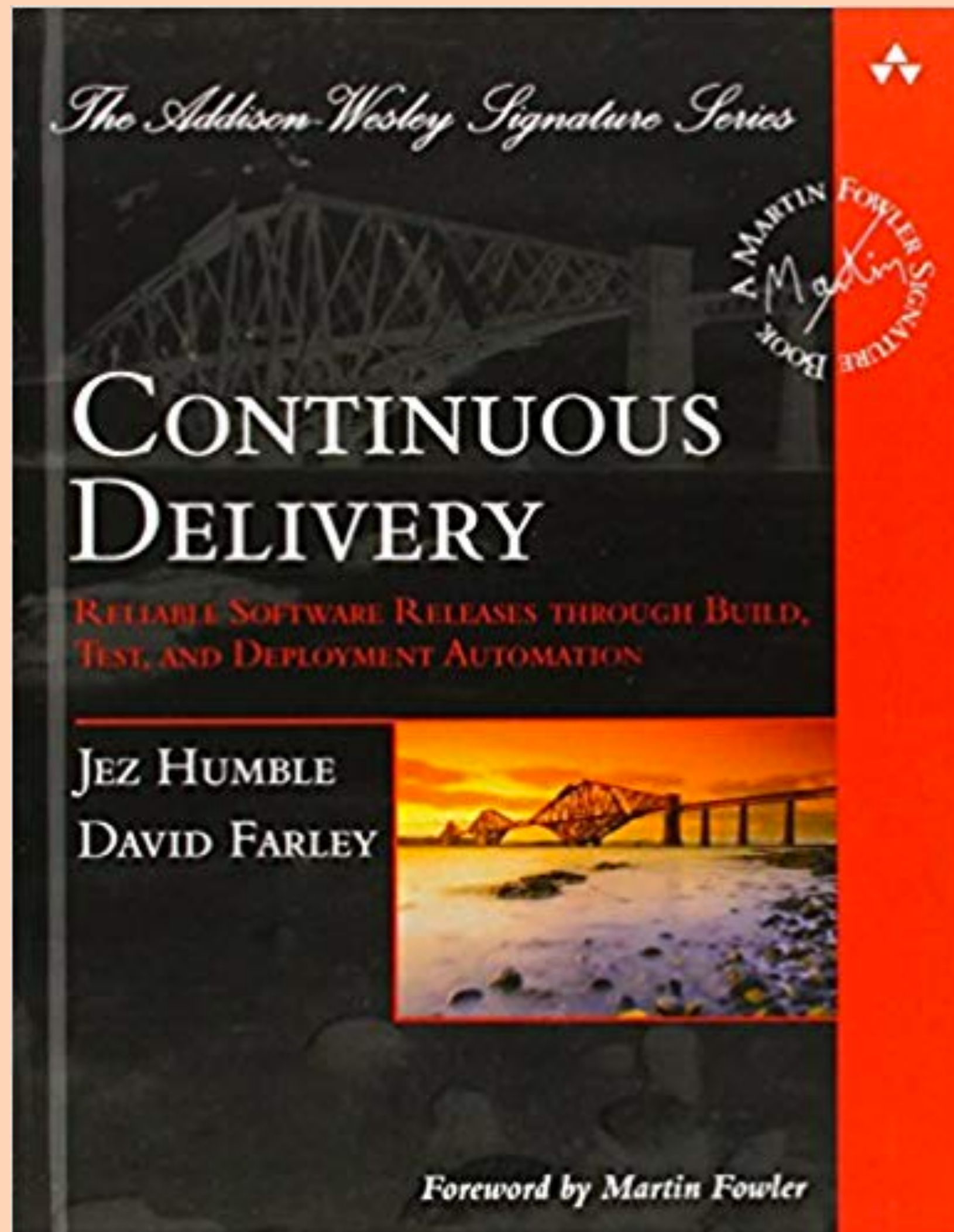
Measure	High performers
Delivery lead time	Less than one hour
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Measure	High performers
Delivery lead time	Less than one hour
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Time to restore service	Less than one hour
Change fail rate	

Measure	High performers
Delivery lead time	Less than one hour
Deployment frequency	On demand
Time to restore service	Less than one hour
Change fail rate	0 - 15%

High performing organisations
release changes frequently

Continuous delivery is the
foundation



“If it hurts, do it more frequently, and bring the pain forward.”

Our old build and deployment process was very manual...

27	<u>26</u>	Release	AHP Buildlife 90271 - FT-CMS (replaces 84244)	Pub Support
28	<u>27</u>	Release	AHP Buildlife 86319 - FT-FEEDS (replaces 81488)	Pub Support
29	<u>28</u>	Release	AHP Buildlife 86374 - contentAPI (replaces 79650)	Pub Support
30	<u>29</u>	Manual Action	<p>On Prod Apache caches do the following: ftweb20-uviw-uk-p ftweb21-uviw-uk-p ftweb20-uvnj-us-p ftweb21-uvnj-us-p</p> <p>"rm /data/apache/cache/www.ft.com/Q/u/2T8LkvhnryfPGL85j6ag.*"</p>	Pub support
31	<u>30</u>	Manual Action	<p>Historical secondaries</p> <p>1) Connect to ft-cms staging DB machine with ssh. 2) Get the script that is located here:</p> <p>http://anthill.svc.ft.com/viewvc/repo/online/website/ft-cms/branches/RELEASE-2.17/config/scripts/use_secondaries.sh?revision=120557&view=co</p> <p>and run it with the given command: ./use_secondaries.sh ftaps01-01-uvpr-uk-qa.osb.ft.com 8080 PREDITOR_USERNAME PREDITOR_PASSWORD > use_secondaries.log</p>	Pub support
32	<u>31</u>	Manual Action	<p>Switch the Content API Tomcat services to point directly to FT-CMS Tomcat rather than FT-CMS Apache.</p> <p>This is done via JMX configuration. Use VisualVM, JConsole or equivalent to connect to each host on port 8533.</p> <p>MBeans: com.ft.deliveryplatform->ClientConfiguration->Attributes</p> <p>Change the PageServiceUrl from http://ftcomrender-web-data.svc.ft.com:80/cms/platform/rest/pages to http://ftaps20-uviw-uk-p:8080/cms/platform/rest/pages (for the two UK content API tomcats) http://ftaps20-uvnj-us-p:8080/cms/platform/rest/pages (for the two US content API tomcats)</p> <p>Change the ContentItemServiceUrl from http://ftcomrender-web-data.svc.ft.com:80/cms/platform/rest/items to http://ftaps20-uviw-uk-p:8080/cms/platform/rest/items (for the two UK content API tomcats) http://ftaps20-uvnj-us-p:8080/cms/platform/rest/tiems (for the two US content API tomcats)</p>	Pub Support

You can't experiment when you do
12 releases a year

1. An automated build and release pipeline

2. Automated testing, integrated into the pipeline

3. Continuous integration

If you aren't releasing multiple times a day, consider what is stopping you

You'll probably have to change the
way you architect things

Zero downtime deployments:

- sequential deployments
 - schemaless databases
-

In hours releases mean the people
who can help are there

You need to be able to test and
deploy your changes independently

You need systems - and teams - to
be loosely coupled

Done right, microservices are
loosely coupled

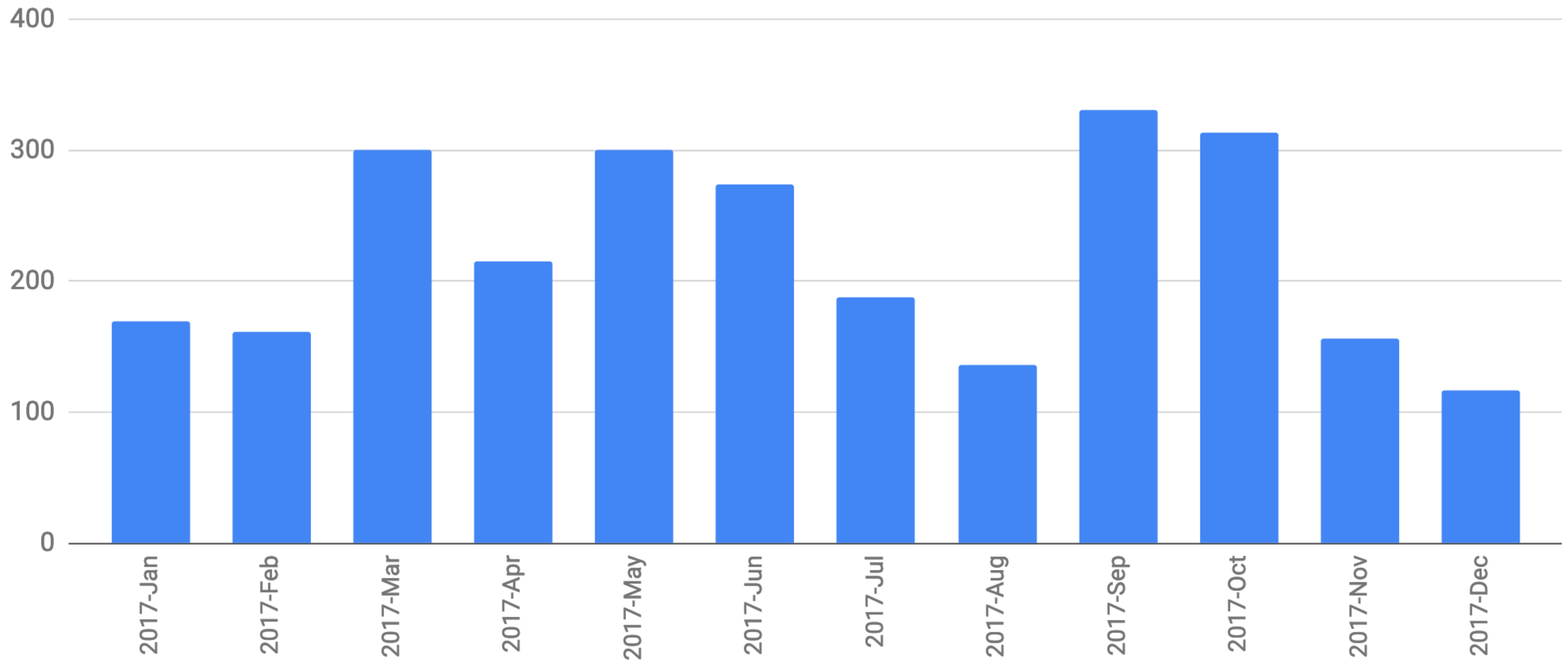
Processes also have to change

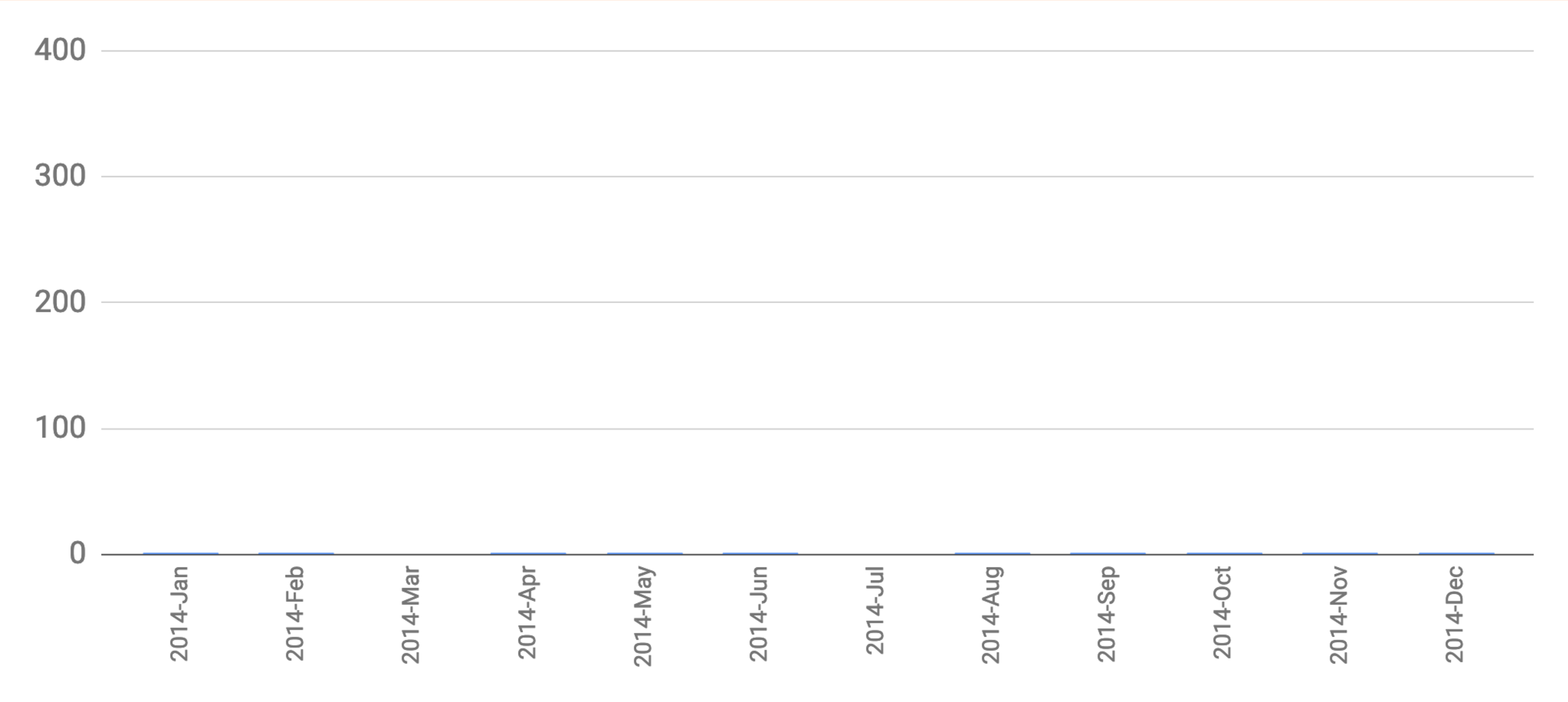
Often there is 'process theatre'
around things and this can safely be
removed

Change approval boards don't reduce the chance of failure

Filling out a form for each change
takes too long

How fast are we moving?

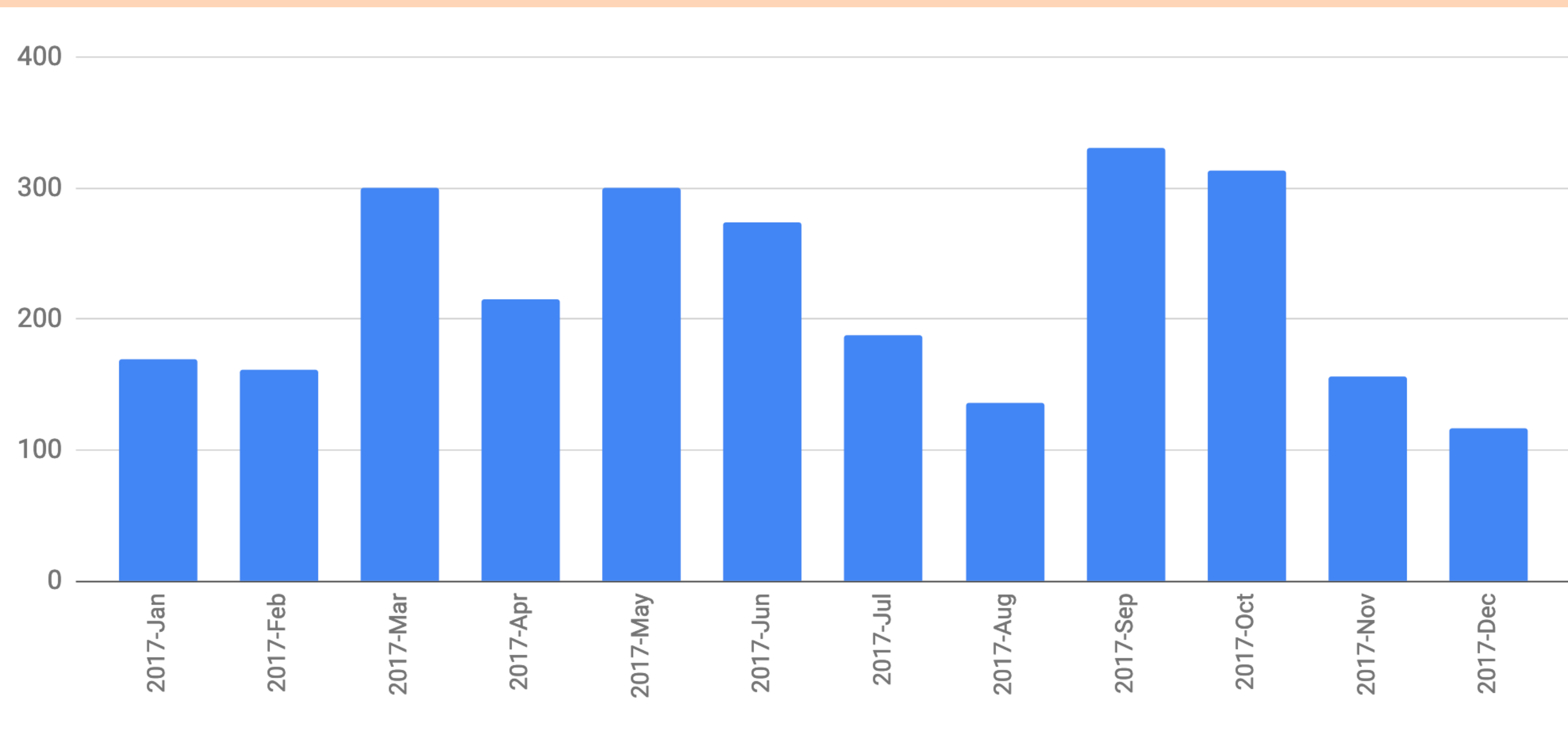




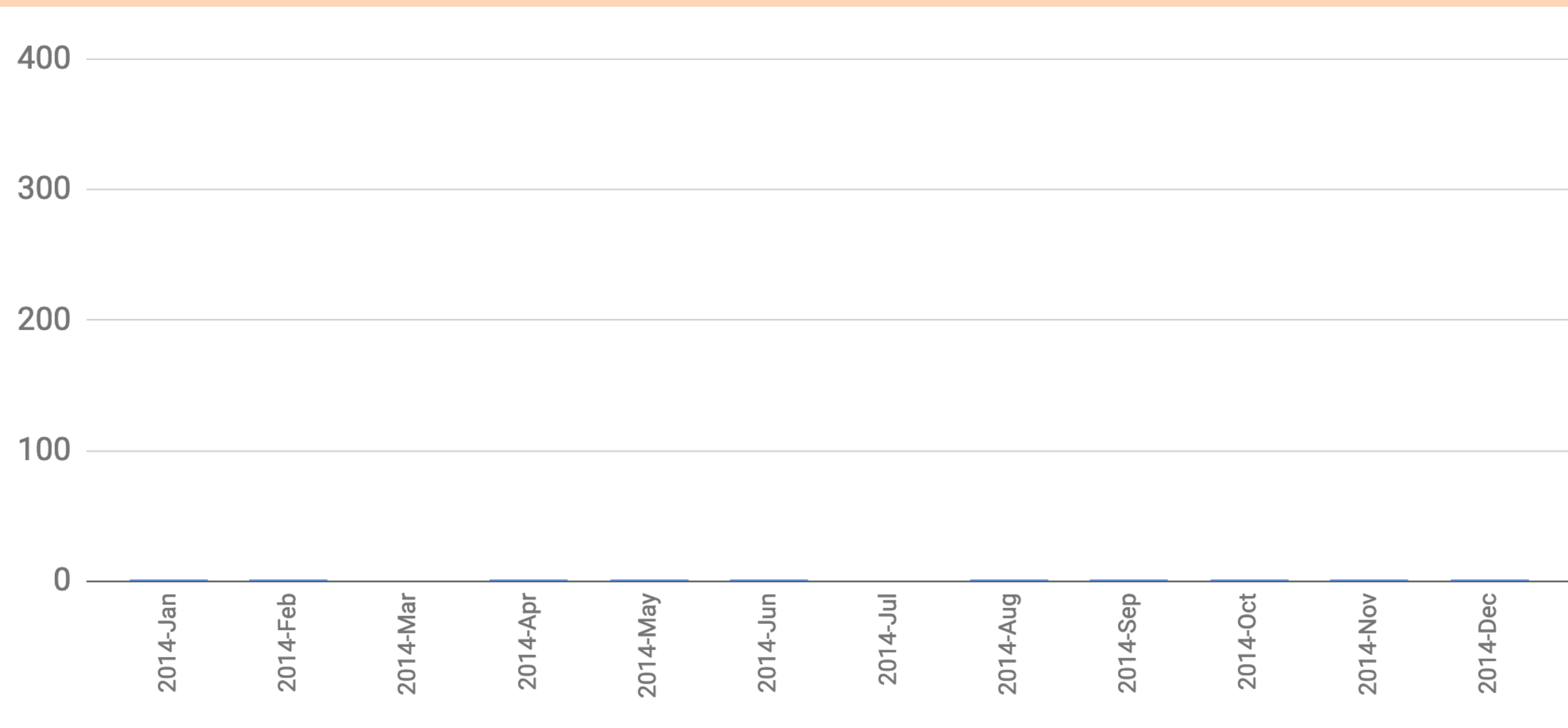
Releasing 250 times as often

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Changes are small, easy to
understand, independent and
reversible



<1% failure rate



~16% failure rate

Optimising for speed

Operating microservices



Dr Snooks

@drsnooks

Following



microservices (n,pl): an efficient device for transforming business problems into distributed transaction problems

1:27 PM - 6 Oct 2015

122 Retweets **61** Likes



There are patterns and approaches
that help

Devops is essential for success

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You can't hand things off to another team when they change multiple times a day

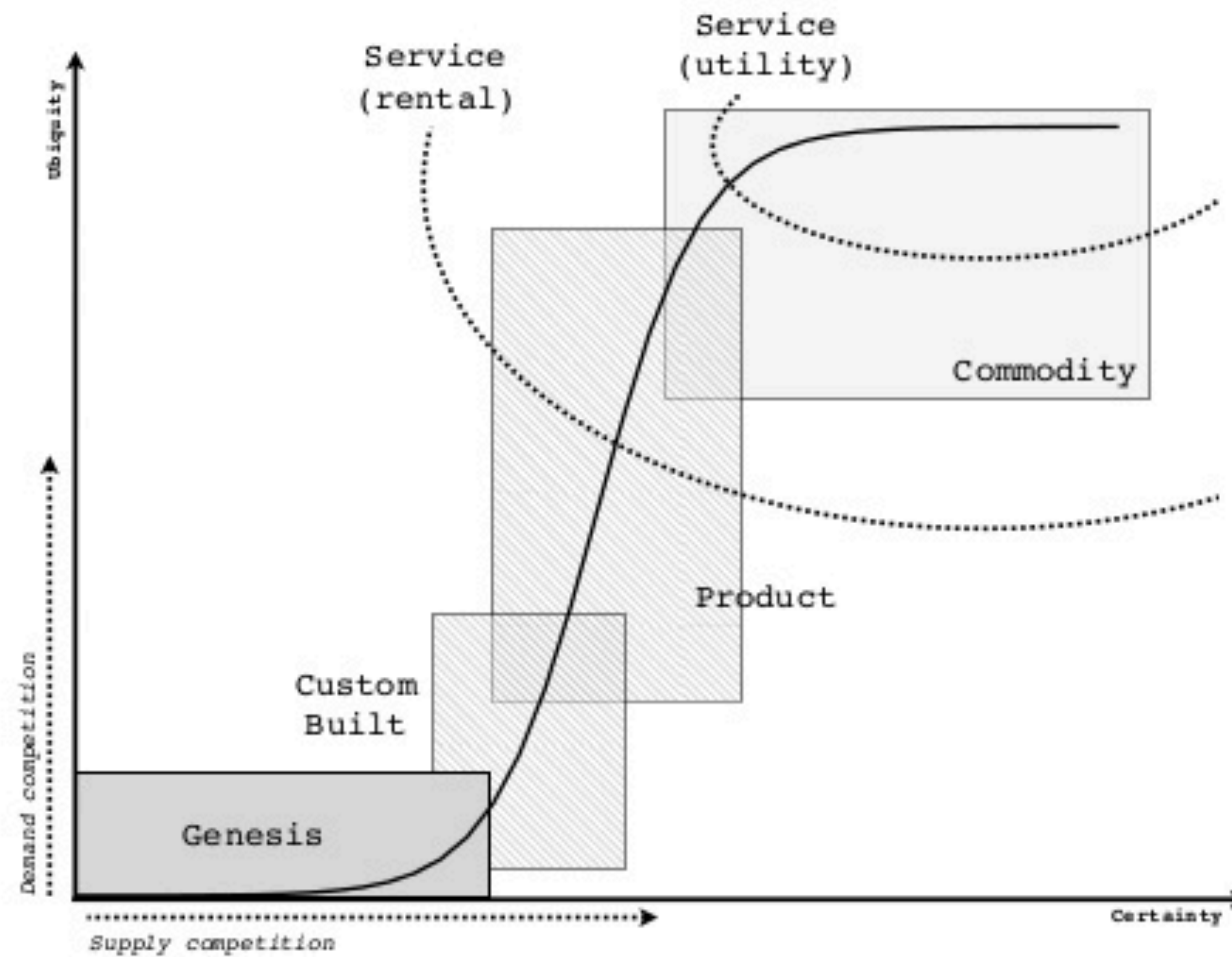
High performing teams get to make
their own decisions about tools and
technology

Delegating tool choice to teams
makes it hard for central teams to
support everything

Make it someone else's problem

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<https://medium.com/wardleymaps>

Buy rather than build, unless it's
critical to your business

Work out what level of risk you're
comfortable with

“We’re not a hospital or a power station”

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We value releasing often so we can
experiment frequently

Accept that you will generally be in
a state of 'grey failure'



Charity Majors

@mipsytipsy

Following



If there's one mental shift that epitomizes the distributed systems era, it's the embrace of failure and hard lean in to resiliency.

And making your failure budget explicit, and *using it*, not chasing perfection. (I find this very soothing.)

6:07 PM - 13 Aug 2018 from [San Francisco, CA](#)

11 Retweets 40 Likes



Retry on failure:

- backoff before retrying
 - give up if it's taking too long
-

Mitigate now, fix tomorrow

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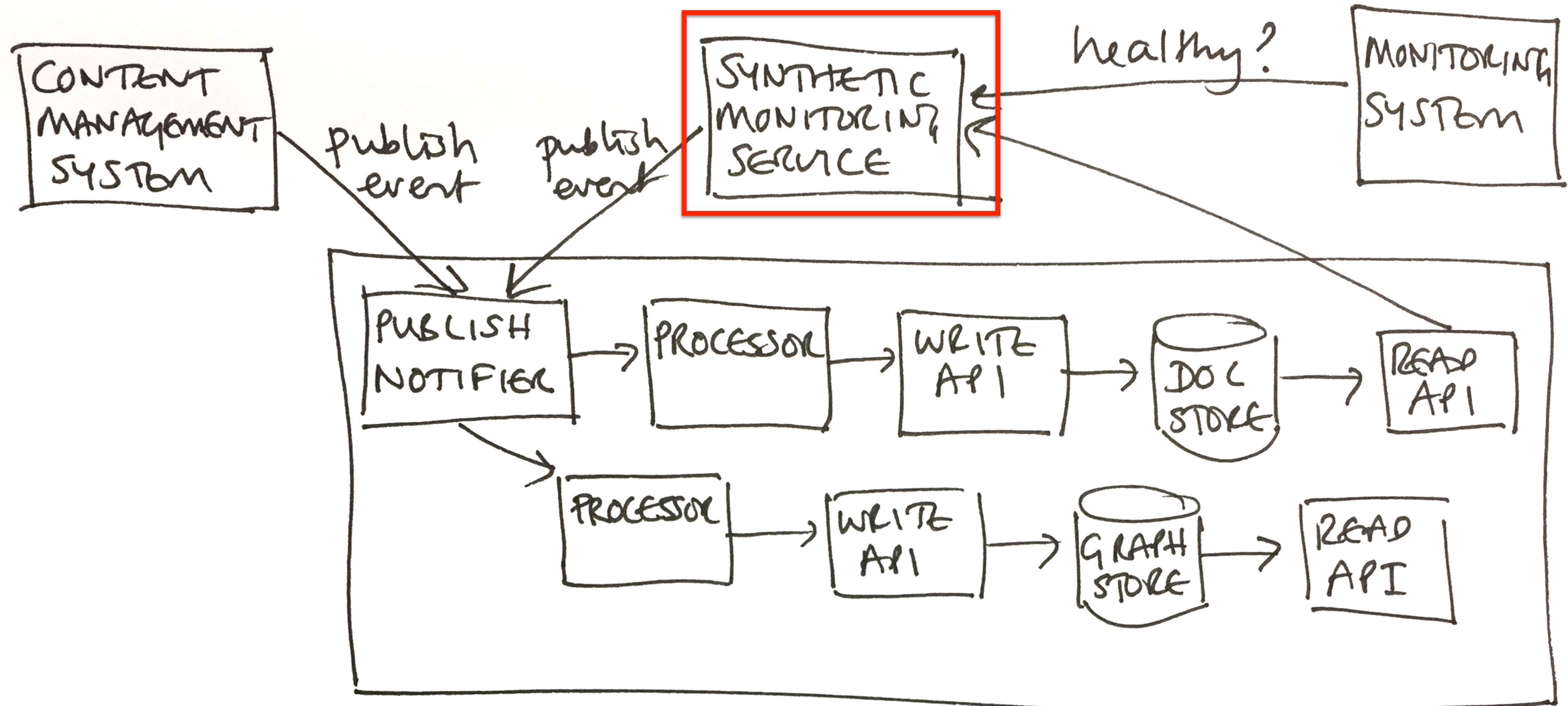
How do you know something's
wrong?

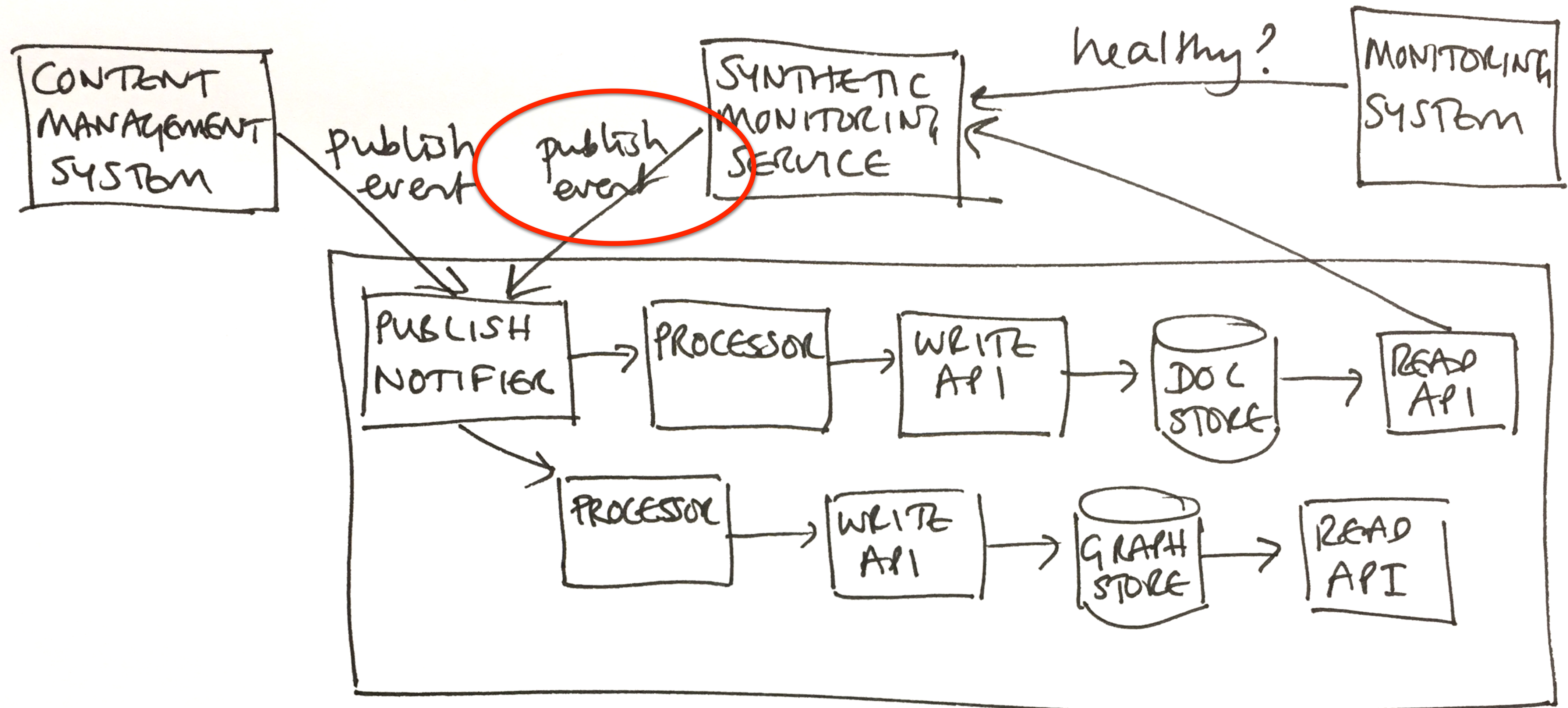
Concentrate on the business capabilities

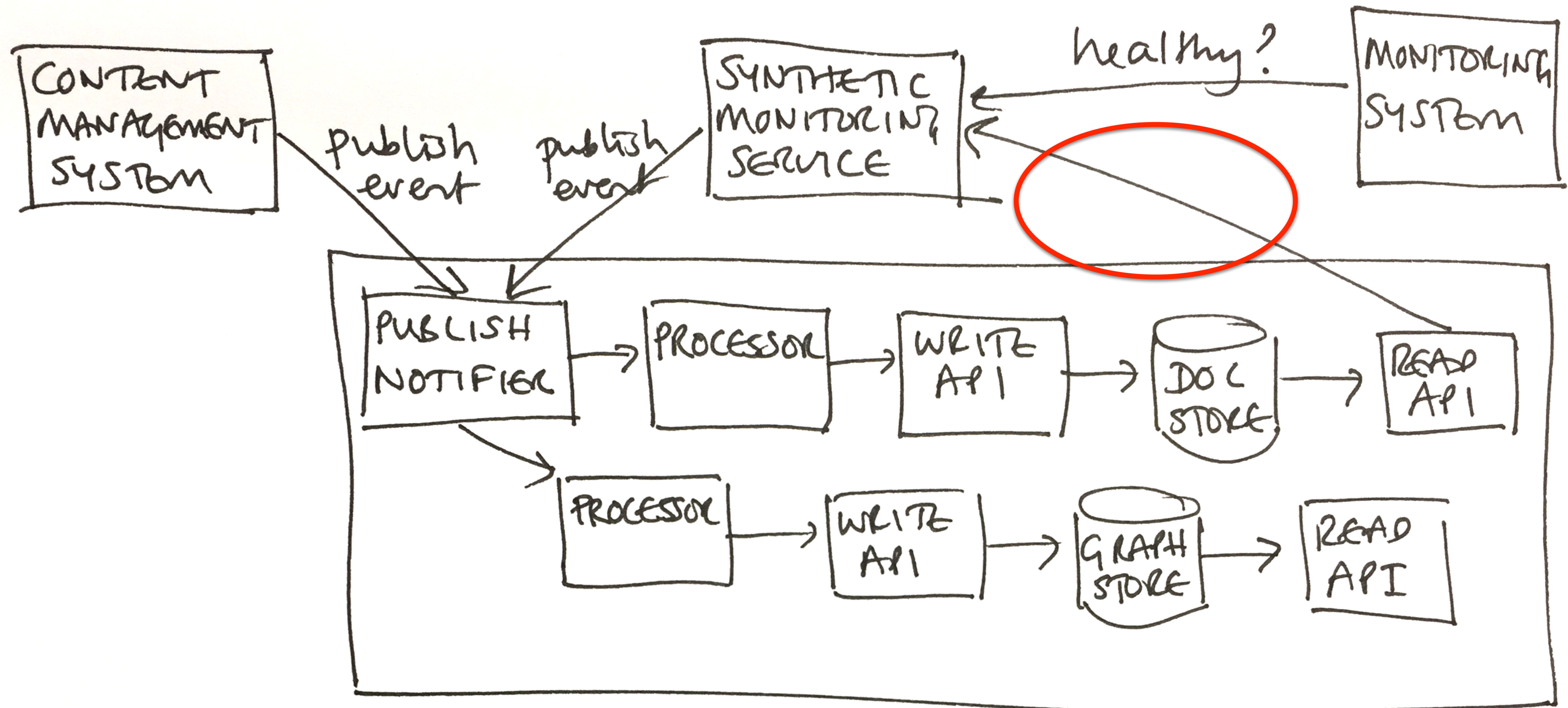
Synthetic monitoring

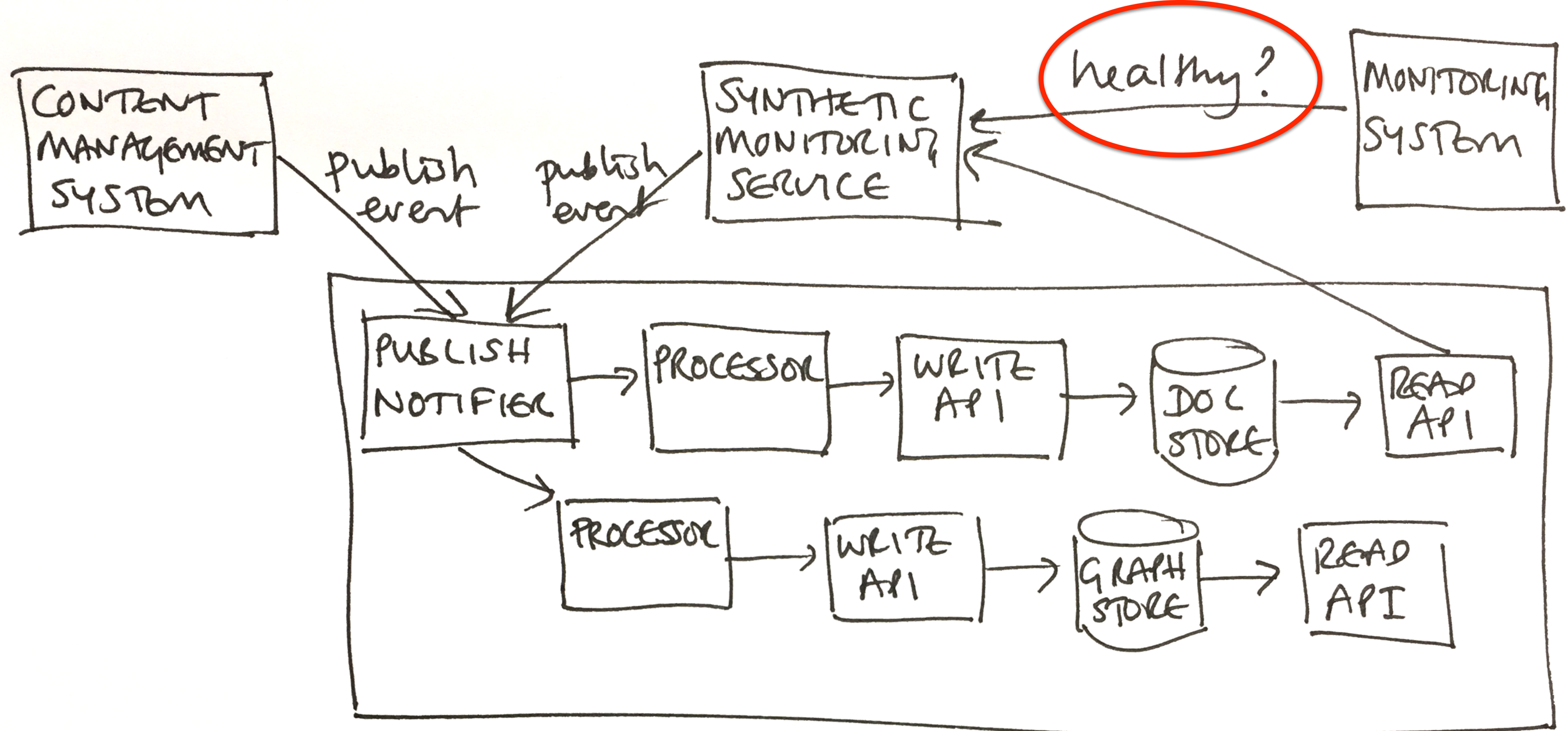
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No data fixtures required

Also helps us know things are broken even if no user is currently doing anything

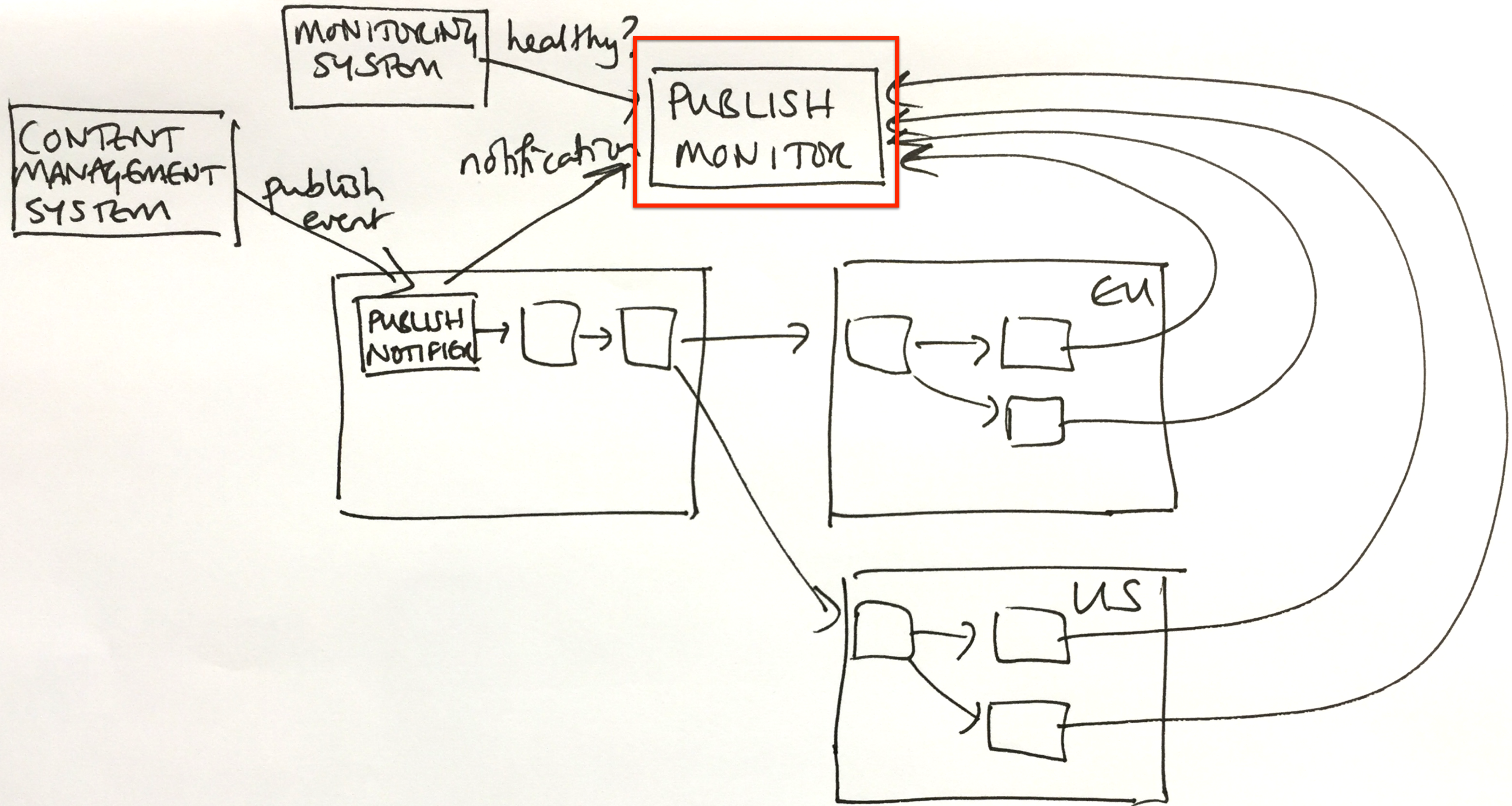
Make sure you know whether
real things are working in
production

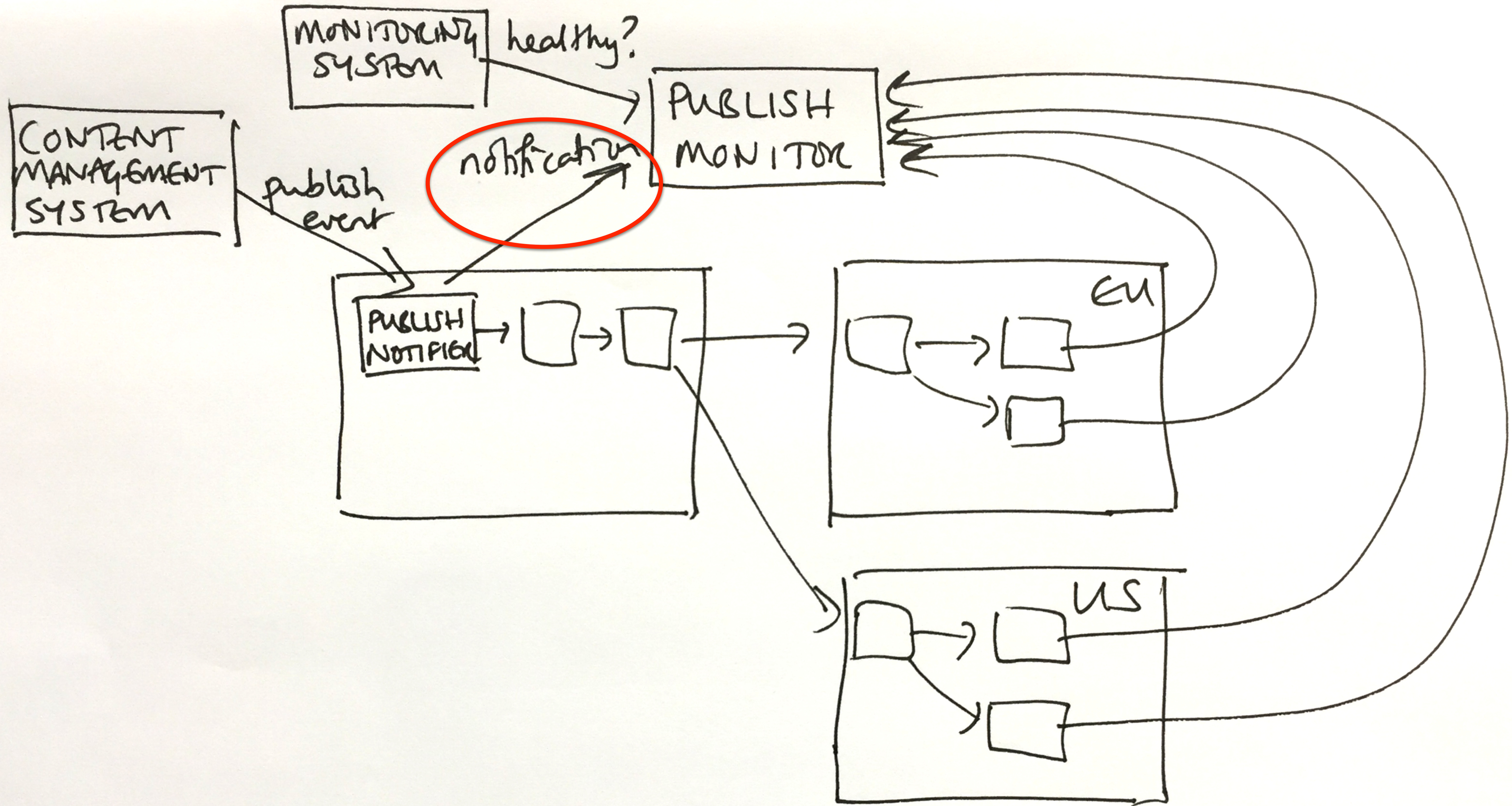
Our editorial team is inventive

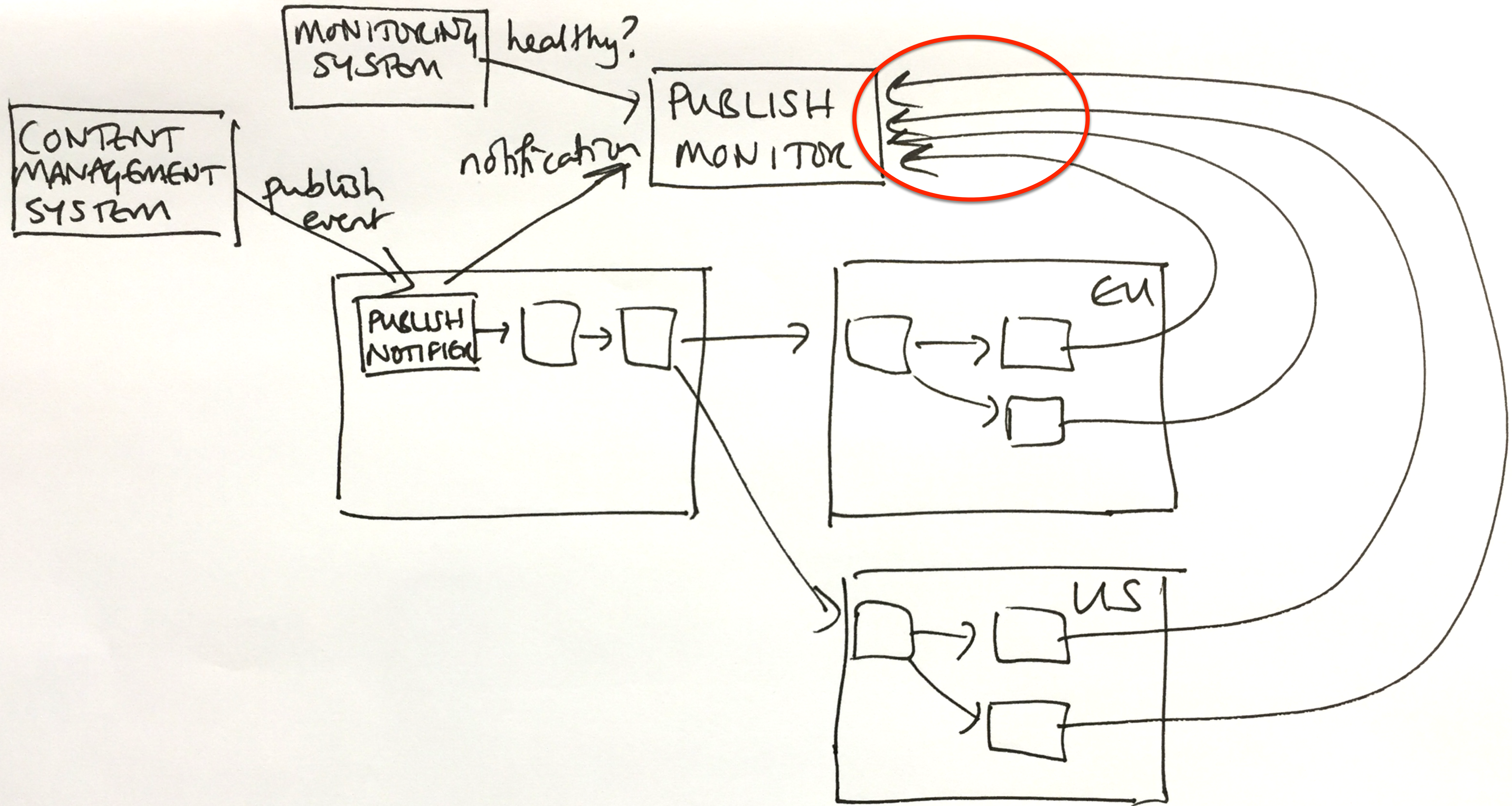
@sarahjwells

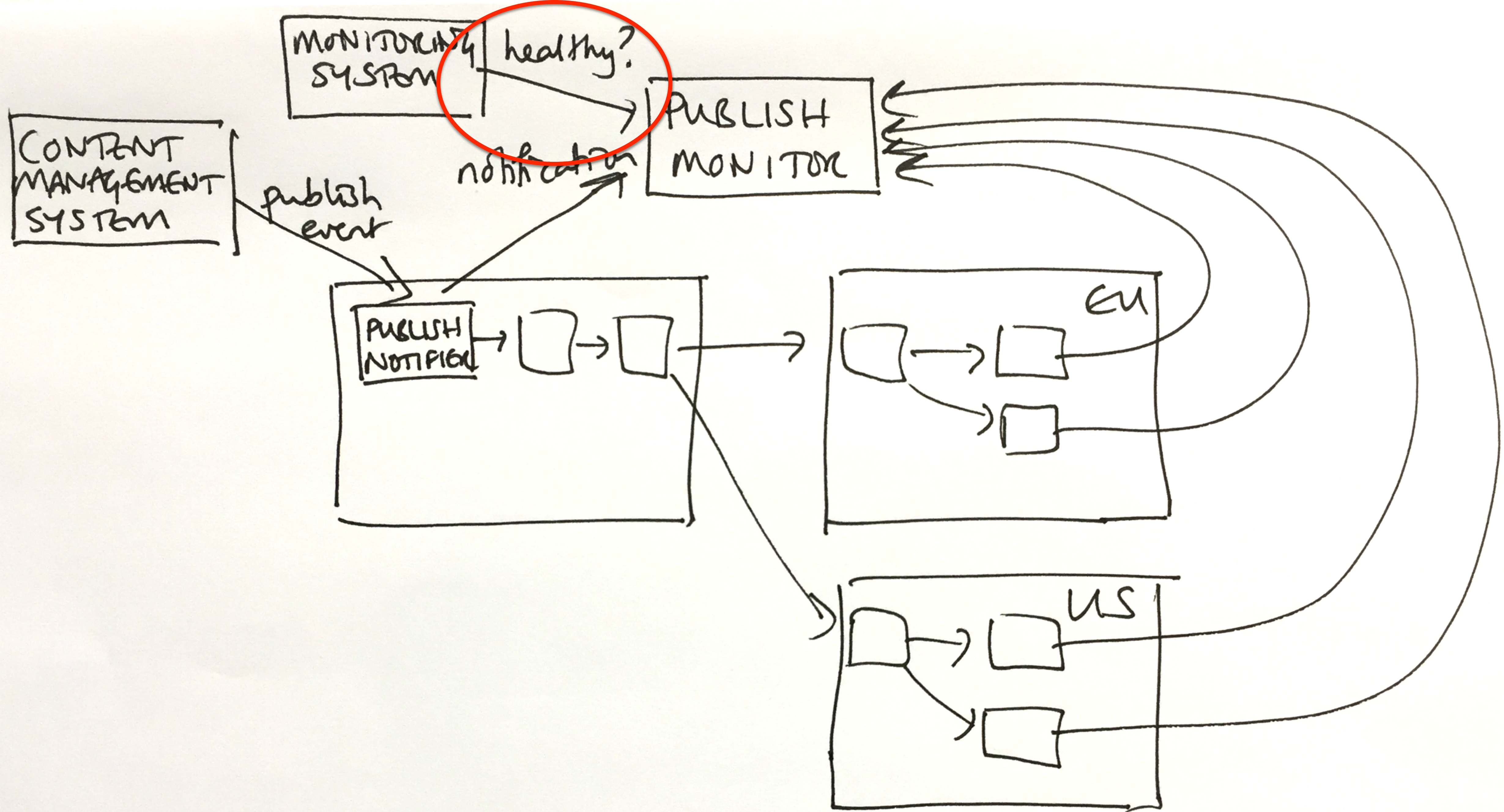
The logo for the Financial Times (FT), consisting of the letters 'FT' in a white serif font on a dark blue square background.

What does it mean for a publish to be 'successful'?









Build observability into your system

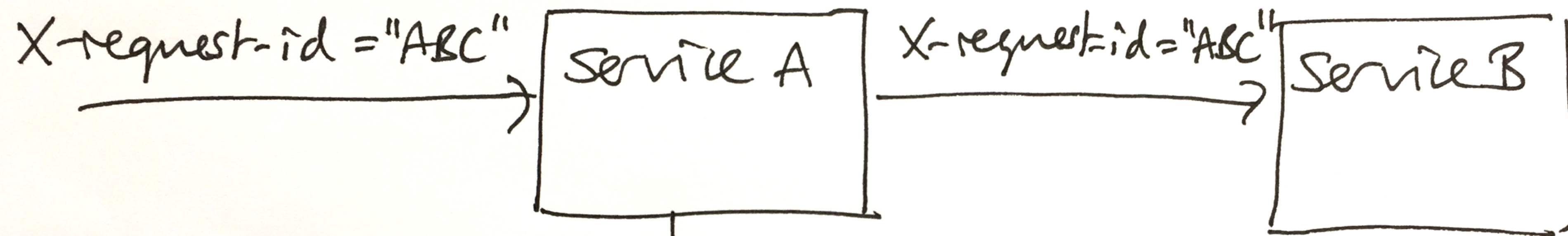
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Observability: can you infer what's going on in the system by looking at its external outputs?

Log aggregation

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LOG: "transaction-id" = "ABC"...

Metrics

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Keep it simple:

- request rate
- latency
- error rate

You'll always be migrating
something

Doing anything 150 times is painful

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Deployment pipelines need to be templated

Use a service mesh

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You'll have services that haven't
been released for years

But you don't want to find out your
service can't be released when you
most need to do it

Build everything overnight?

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Optimising for speed

Operating microservices

When people move on

Every system must be owned

If you won't invest enough to keep
it running properly, shut it down

Keeping documentation up to date
is a challenge

We started with a searchable runbook library

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Liz Fong-Jones (方禮真) ✈️ #QCon...

@lizthegrey

Following



Your runbooks are useful for knowing what to do to stop the spread of the fire, but if you know exactly what *causes* your problems, you'd have automated the solution already.

On a mature SRE team, every failure is novel, so don't overinvest in runbooks.

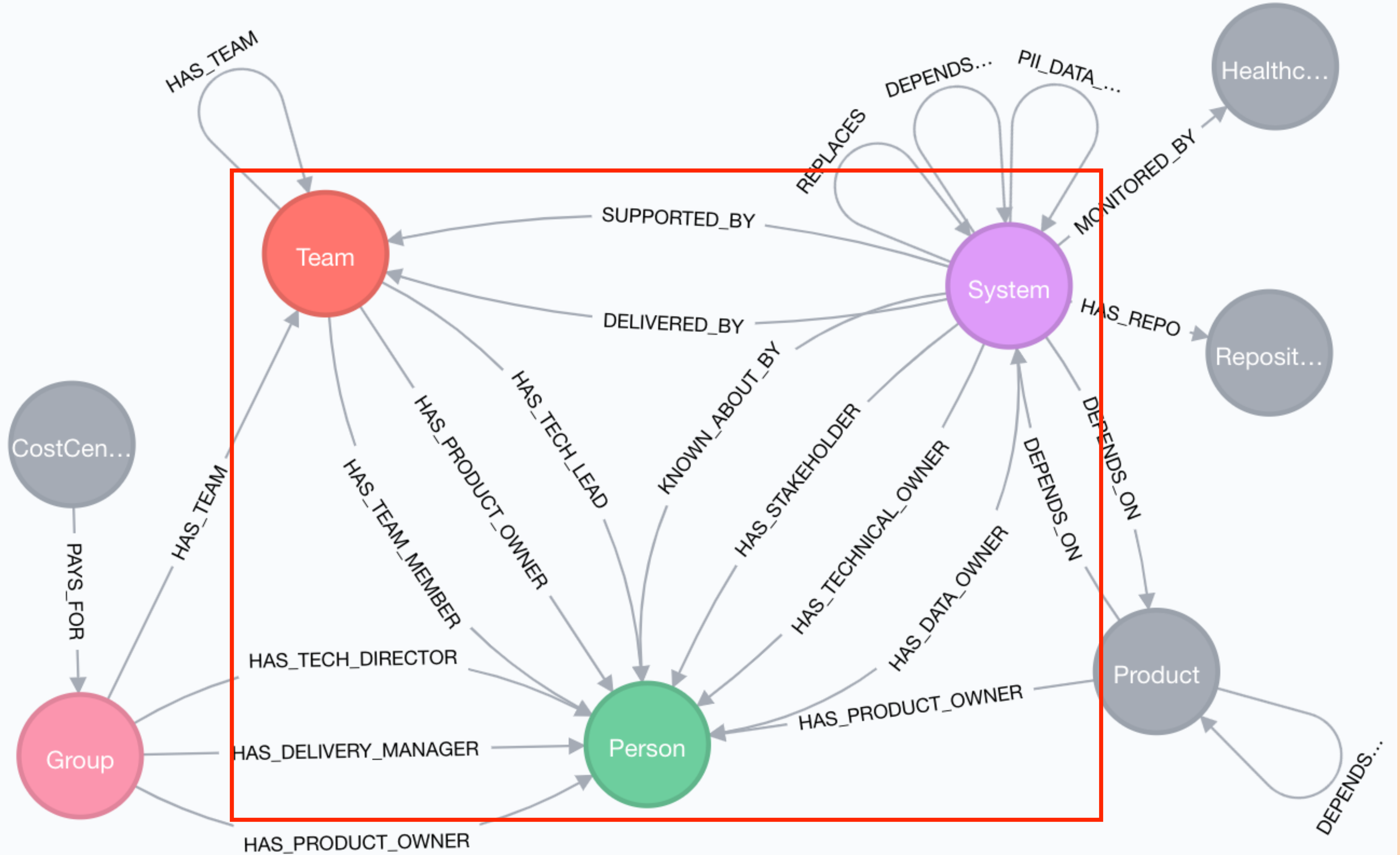
1:27 PM - 1 Sep 2018

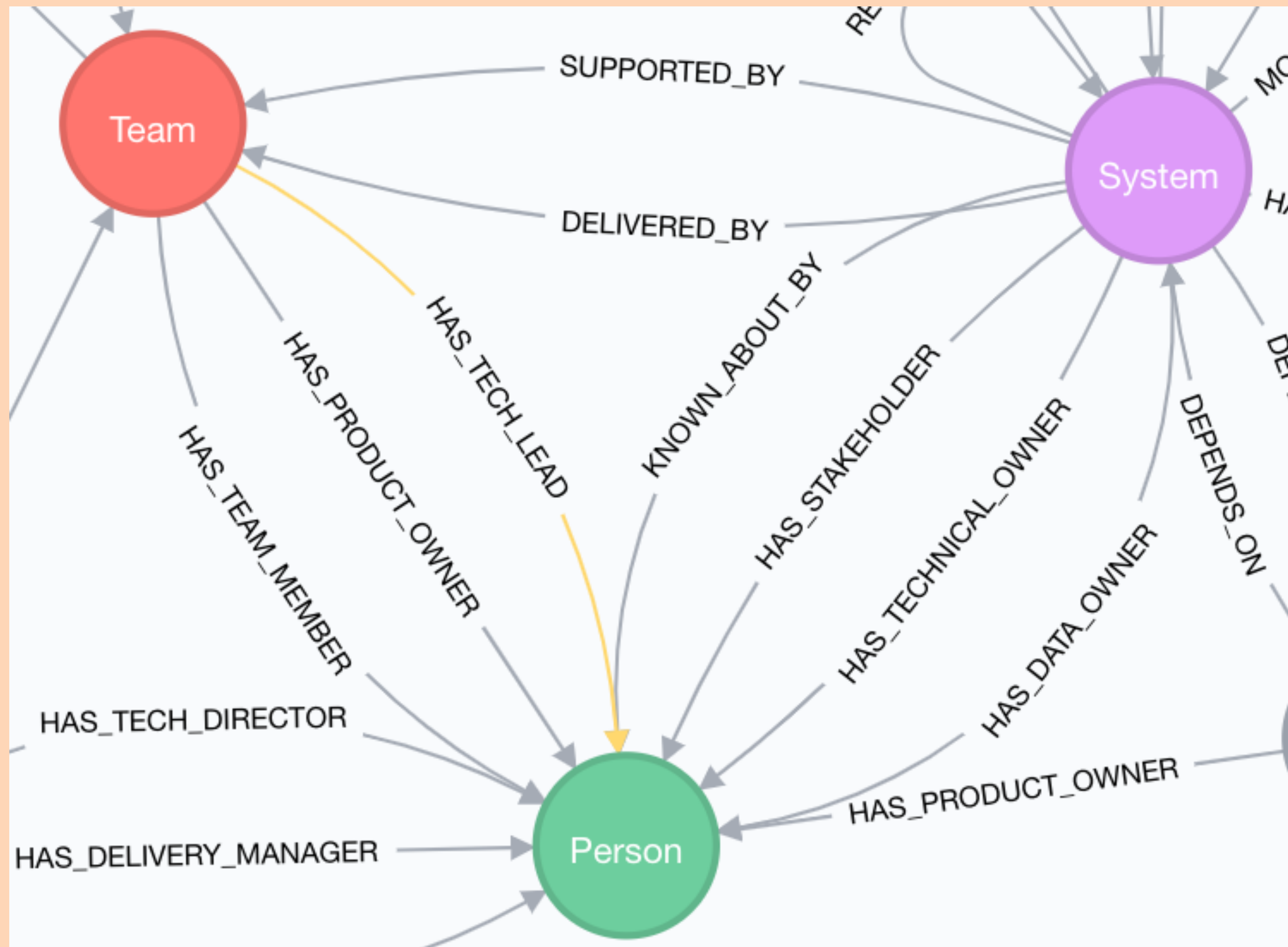
33 Retweets 70 Likes



System codes are very helpful

We needed to represent this stuff as
a graph





Helps if you can give people
something in return

T

Heimdall

Monitoring hub

FAQs

Add Monitoring

Report a bug

Team: Reliability Engineering

Toggle Healthy Systems

Hide

Sort by: Service Tier

Last updated 1 second ago

System checks monitored by operations

0 unhealthy

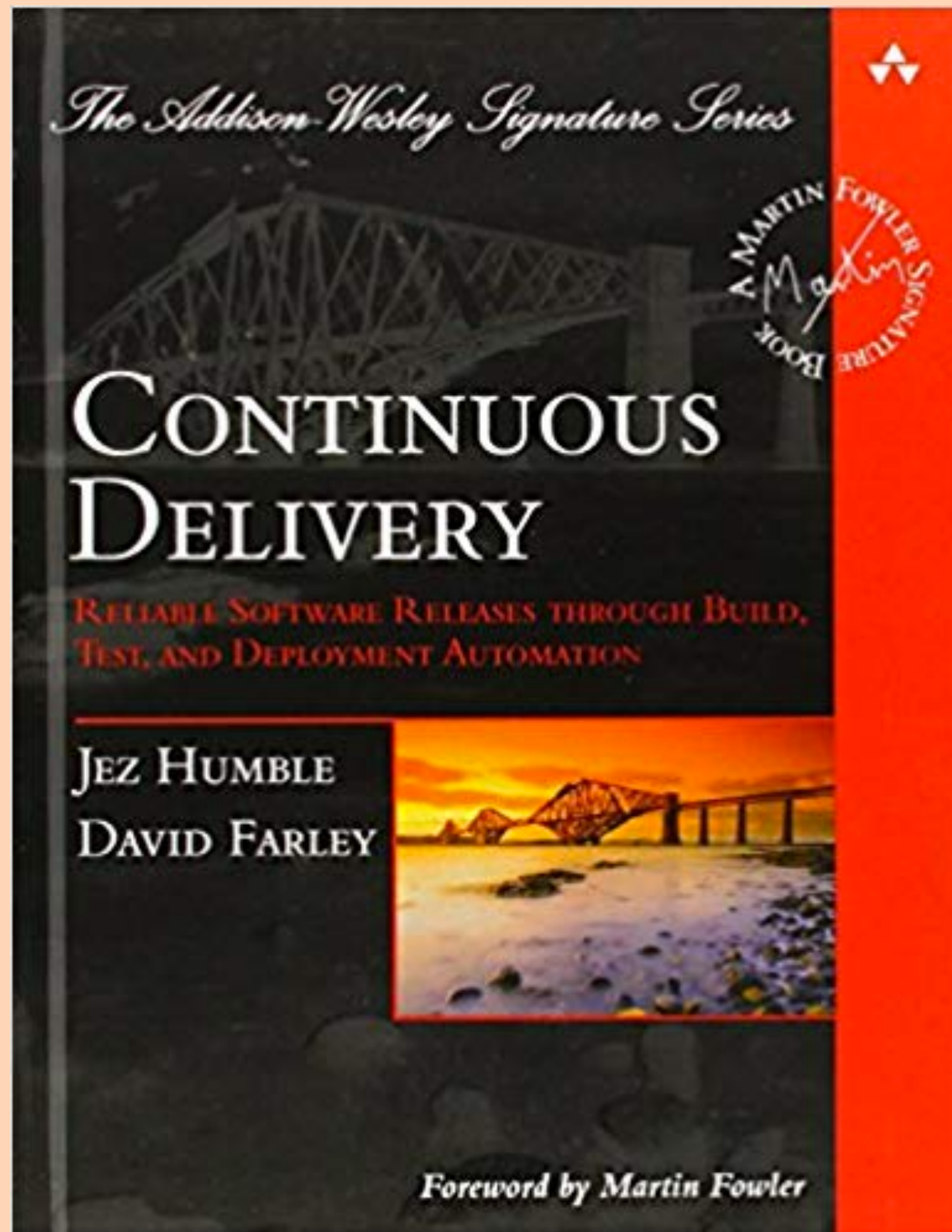
16 healthy

^

<div>Biz Ops Runbooks</div> <div>Platinum</div>	<div>Prometheus</div> <div>Platinum</div>	<div>Prometheus Alertmanager</div> <div>Platinum</div>	<div>Prometheus Health Check Exporter</div> <div>Platinum</div>
<div>Prometheus Nagios Exporter</div> <div>Platinum</div>	<div>Prometheus Pingdom Exporter</div> <div>Platinum</div>	<div>Prometheus Zabbix Exporter</div> <div>Platinum</div>	<div>Jira</div> <div>Gold</div>
<div>Konstruktor - Encryption Service API</div> <div></div>	<div>BitBucket</div> <div></div>	<div>Biz Ops admin</div> <div></div>	<div>Biz Ops API</div> <div></div>

<div>Falcon</div> <div>Platinum</div>	<div>Falcon - Predator!</div> <div>2 / 2 failing</div> <div>PlatinumDecommissioned</div>	<div>Platform for Annotation Curation</div> <div>Platinum</div>	<div>Universal Publishing Platform</div> <div>Platinum</div>
<div>Falcon - Search API</div> <div>Gold</div>	<div>Ontotext - Recommended Reads!</div> <div>1 / 1 failing</div> <div>BronzeDecommissioned</div>	<div>Publish History API</div> <div>Bronze</div>	<div>SSO Subscription Service - B2B Application</div> <div>Bronze</div>
<div>SSO Subscription Service - My Licence Application</div> <div>Bronze</div>	<div>UPP - Methode API</div> <div>Bronze</div>	<div>UPP - Public Six Degrees Backend App</div> <div>Bronze</div>	<div>UPP - Public Six Degrees Frontend App</div> <div>Bronze</div>
<div>UPP Exports</div> <div>Bronze</div>	<div>Falcon - Feeds!</div> <div>2 / 2 failing</div> <div>UnsupportedDecommissioned</div>	<div>Falcon - Quick Metadata Interface (QMI)</div> <div>UnsupportedDecommissioned</div>	<div>Thing Displayer</div> <div>Unsupported</div>

Practice



“If it hurts, do it more frequently, and bring the pain forward.”

Failovers, database restores

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Chaos engineering

<https://principlesofchaos.org/>

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Understand your steady state

Look at what you can change - minimise the blast radius

Work out what you expect to see happen

Run the experiment and see if you were right

Wrapping up...

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Building and operating
microservices is hard work

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You have to maintain knowledge of
services that are live

Plan now for the future of legacy microservices

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Remember: it's all about the
business value of moving fast

Thank you!

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