



# Engineering Reliability for Critical Infrastructure



Hi,  
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Site Reliability Engineer – Independent Contractor (formerly)

Links: <https://konst.kiwi/>



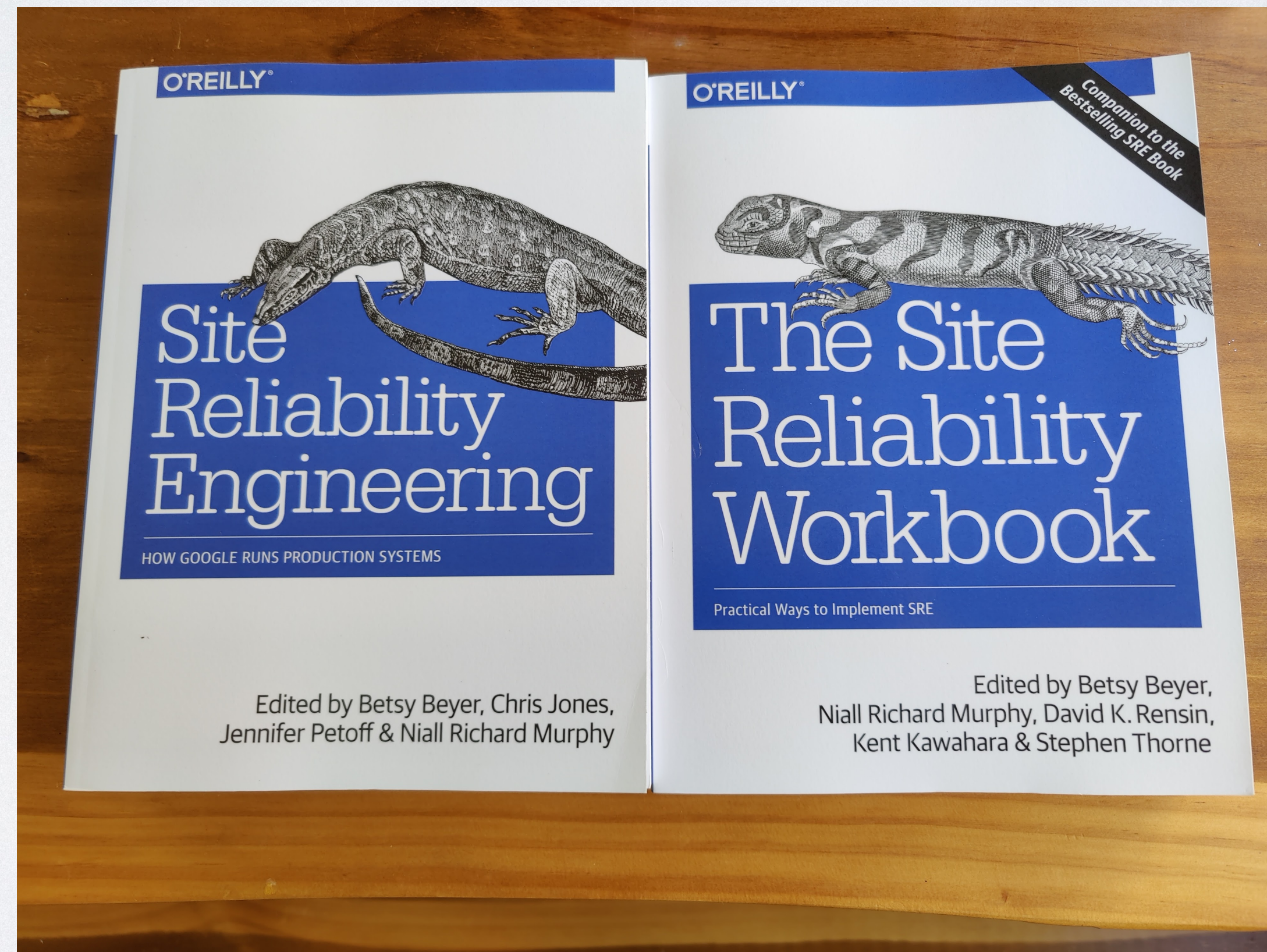
# Site Reliability Engineering (SRE)

- Software Engineering approach to reliability.
- Embrace Risk.
- Work towards agreed levels of reliability, not above.
- Eliminate Toil.
- Automation.



# Site Reliability Engineering (SRE)

<https://sre.google/books/>







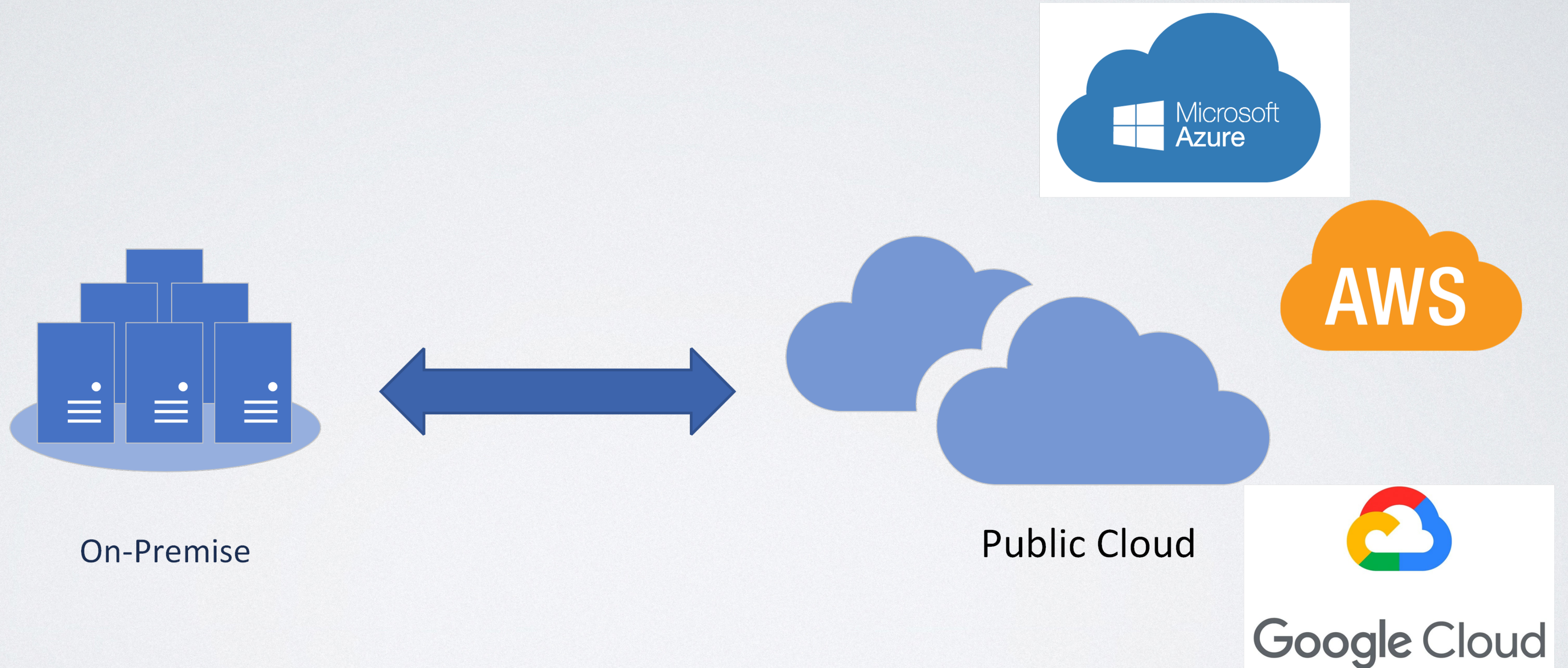
Auckland's electricity distribution







# Hybrid Cloud









# Risks

- *Natural disasters.*
- *Power failures.*
- *Internet failures.*
- *Malicious nation-state cyber attacks.*
- **Third party software bugs.**
- **Data corruption due to user error.**
- **On-premise networking, stability issues.**
- **Developer error. Bad deployments.**



“Hope Is Not a Strategy.”

– Traditional SRE saying

<https://sre.google/sre-book/introduction/>



# Service Level Objectives (SLOs)

- Meet an agreed level of reliability.
- Simplest SLO: % uptime.
- Or: 
$$\frac{\text{number of successful API responses}}{\text{total API responses}}$$







# Uptime and downtime with 99.99 % SLA

[ [simple](#) / [flexible](#) / [reverse](#) / [about](#) / [API](#) ]

**Agreed SLA level:**  % (enter SLA level and hit the <enter> key)

SLA level of 99.99 % uptime/availability results in the following periods of allowed downtime/unavailability:

- **Daily:** 8.6s
- **Weekly:** 1m 0.48s
- **Monthly:** 4m 21s
- **Quarterly:** 13m 2.4s
- **Yearly:** 52m 9.8s

Direct link to the page with these results: [uptime.is/99.99](https://uptime.is/99.99) (or [uptime.is/four-nines](https://uptime.is/four-nines))

The SLA calculations assume a requirement of continuous uptime (i.e. 24/7 all year long) with additional approximations as described in the [source](#). *uptime.is* was originally implemented in [newLISP](#), which had powered uptime and downtime calculations for more than a decade.

For convenience, there are special CEO and SEO friendly links for *N nines*: [three nines](#), [four nines](#), [five nines](#), [six nines etc.](#)



**100%** Reliability





DB-B R1

ZONE 1

ZONE 2

ZONE 3

ZONE 4

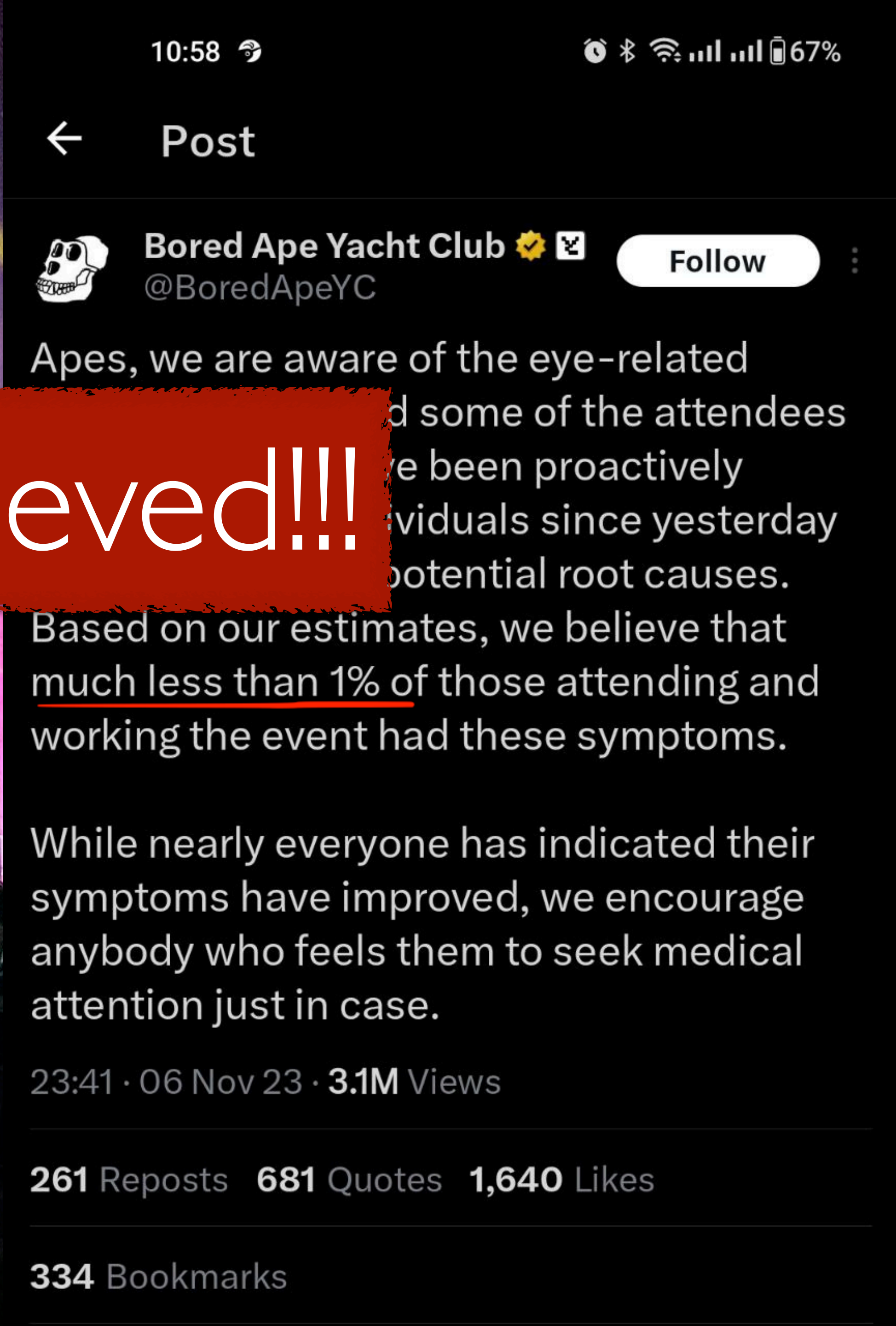
ZONE 5

K









CRYPTO

# 'Couldn't See Anymore:' Bored Ape Conference Attendees Wake Up With Searing Eye Pain, Vision Loss

SAMANTHA COLE · NOV 6, 2023 AT 9:14 AM





# SL0s Need Agreement

Team AND stakeholders.



Negotiate.

Negotiate.

Negotiate.



Measurable.



Automate SLOs.



Report on SLOs.



# Not Meeting an SLO

- Reduce risk immediately.
  - e.g. pause feature work, focus on stability.
- Assess risks for next period.



# Embracing Failure



**Postmortems:** learning from failure

Blamelessly



“Someone disconnected the switch”



**Share** the postmortems.



“Type a quote here.”

—Joe Bloggs



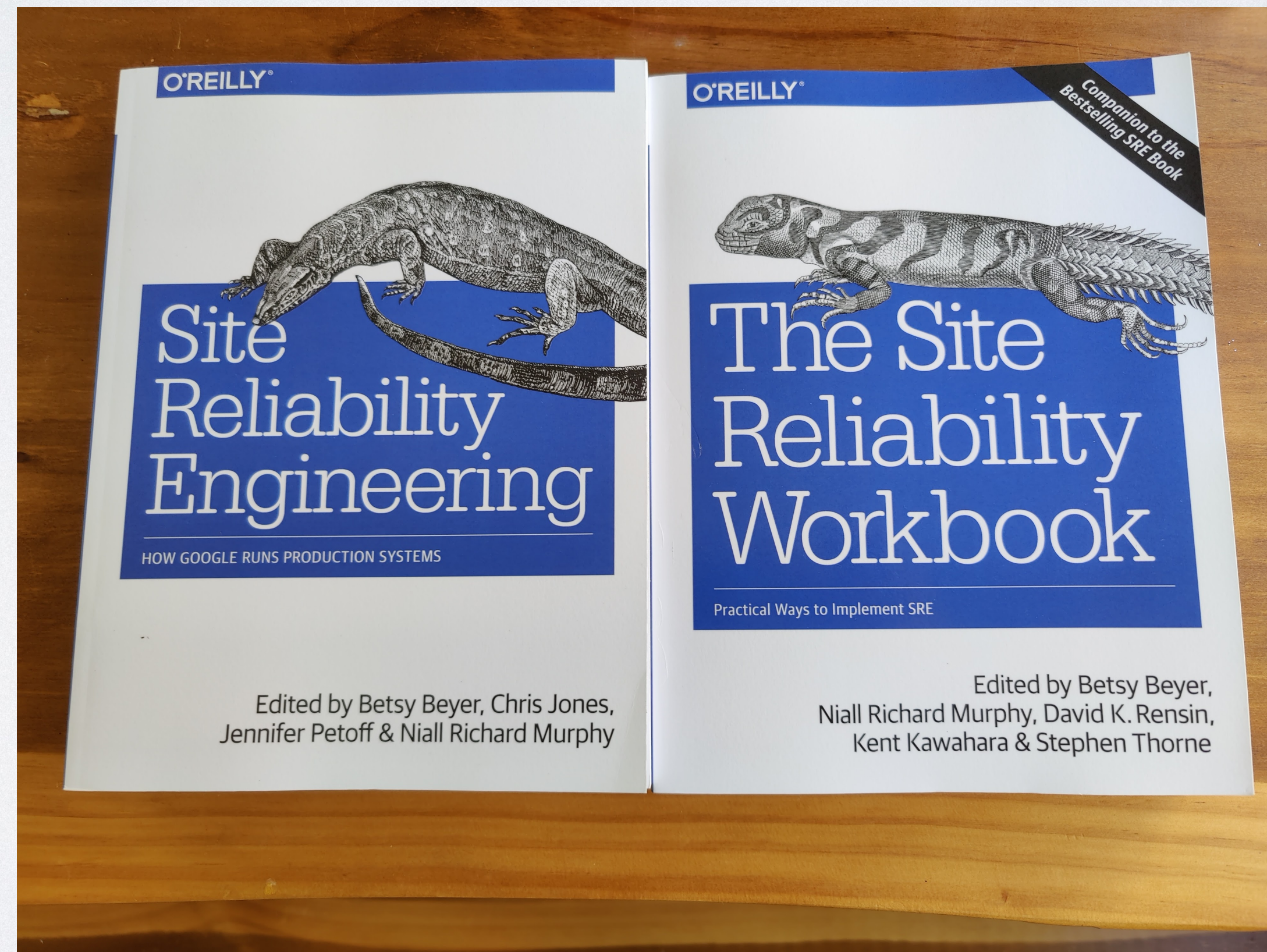
# Toil





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# Questions

<https://konst.kiwi/>