
AWS
re:Invent

BLD203

Intentionally failing in production at Amazon Prime Video

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Amazon Prime Video

AWS re:Invent

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“Everything fails all of the time.”



Dr. Werner Vogels

CTO

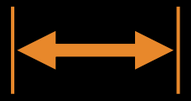
Amazon.com

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Availability = Feature # 1



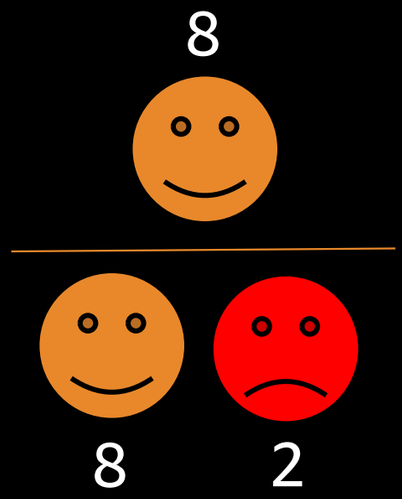
Customers can use our service within the defined KPIs



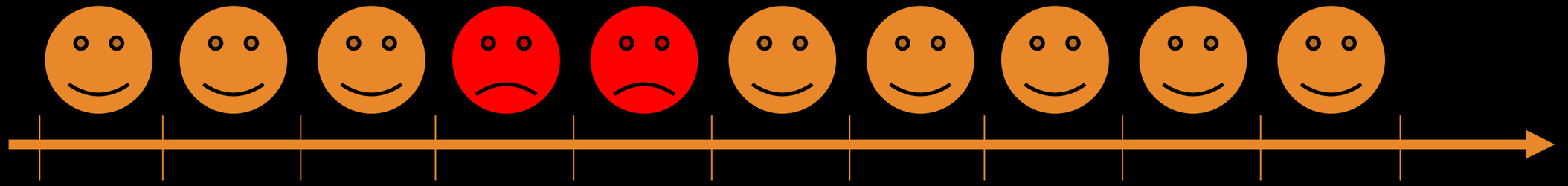
Measured over this time period

Availability = Feature # 1

Availability = proportion of time we achieve that



= 80%



Outage postmortem

Customer impact

Root cause

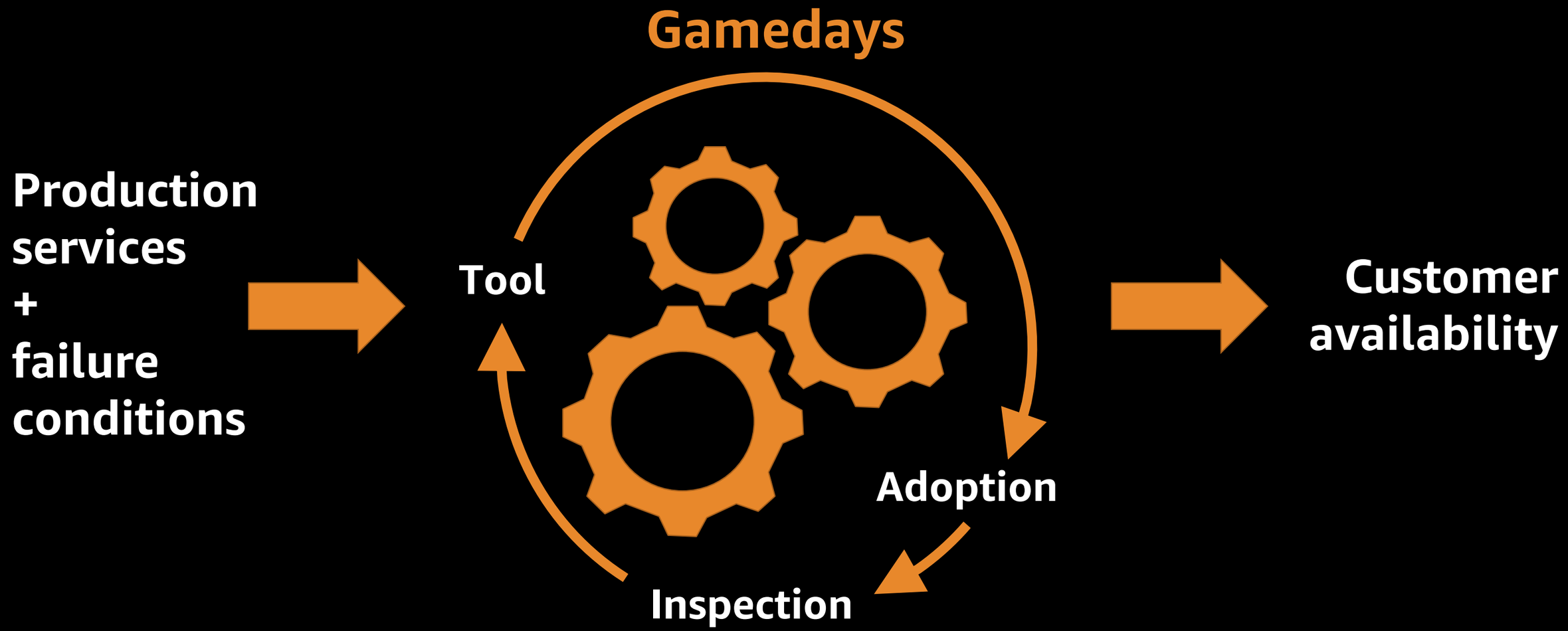
Learning

Mitigation

Prevention



Resilience validation mechanism



Knowing the unknown

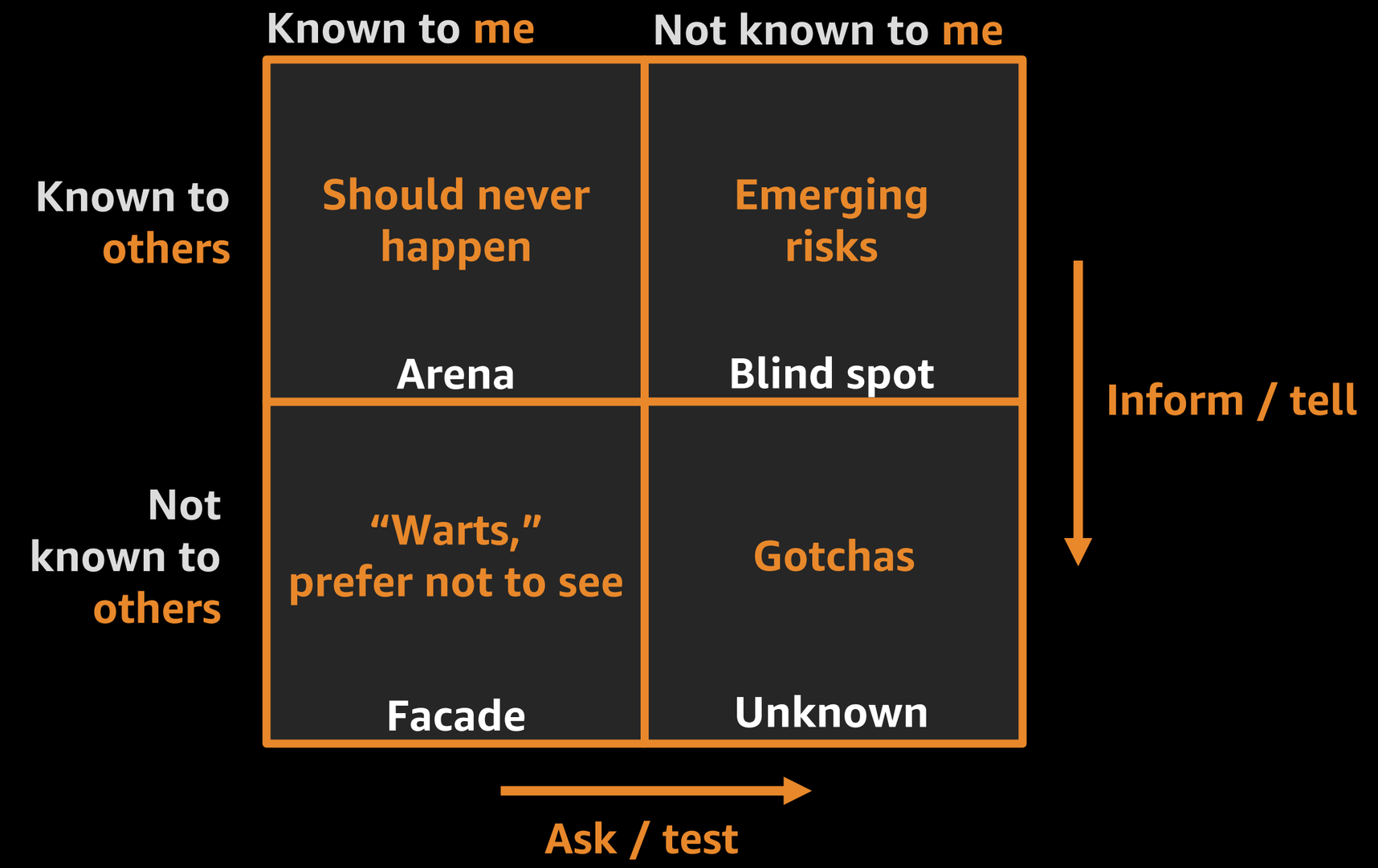
known knowns; *…* *things we know we know. …*

known unknowns; *…* *things we do not know. …*

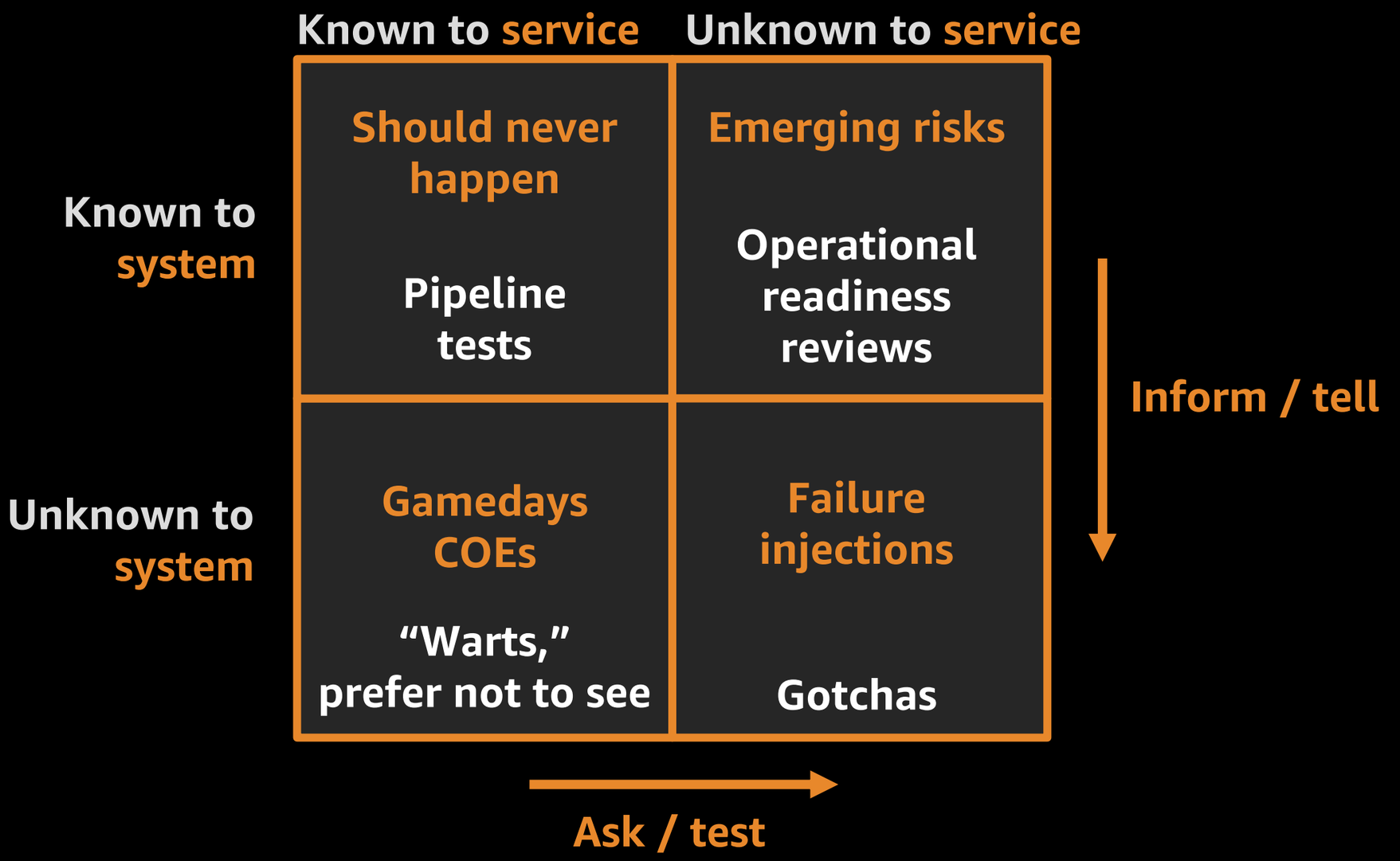
unknown unknowns *…* *the ones we don't know we don't know …*

Donald Rumsfeld, former US Secretary of Defense

Johari window and risk



Johari window and systems view



Chaos engineering

Experiment at leisure in test

A scientific procedure undertaken to make a discovery, test a hypothesis, or demonstrate a known fact

Oxford Languages



Resilience validation

Validate failure scenarios in <u>production</u>



The action of checking or proving the validity or accuracy of something

Oxford Languages

Prime Video's journey



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Availability Zone failures

Thursday Night Football 2017

- Take production hosts out of load balancers
- Watch for errors and compute load (CPU)

Learning: We have additional “headroom”



Host reboots

English Premier League 2019

- Rebooted production hosts
- No worries, just like a deployment

Learning: stale dependency configurations



Dress rehearsals

English Premier League 2019

- Simulation across 6 control centers
- Reboot 10,000 hosts over 2 days

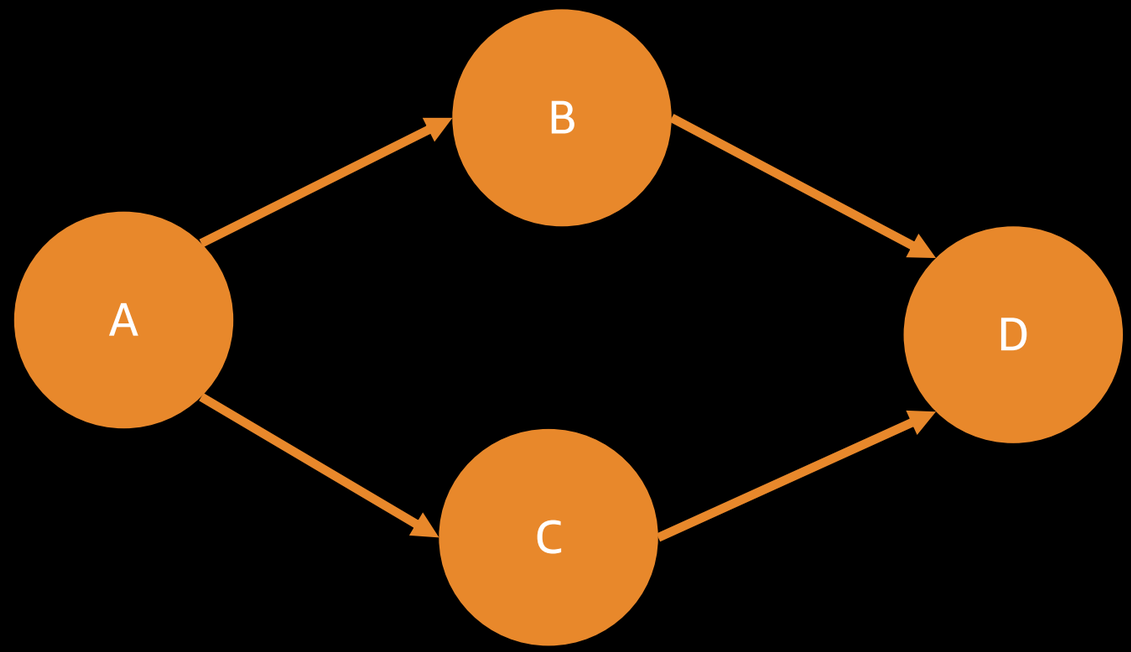
Learning: Got us ready fast
Was fun!
No manual data entry



Dependencies

Microservices architecture

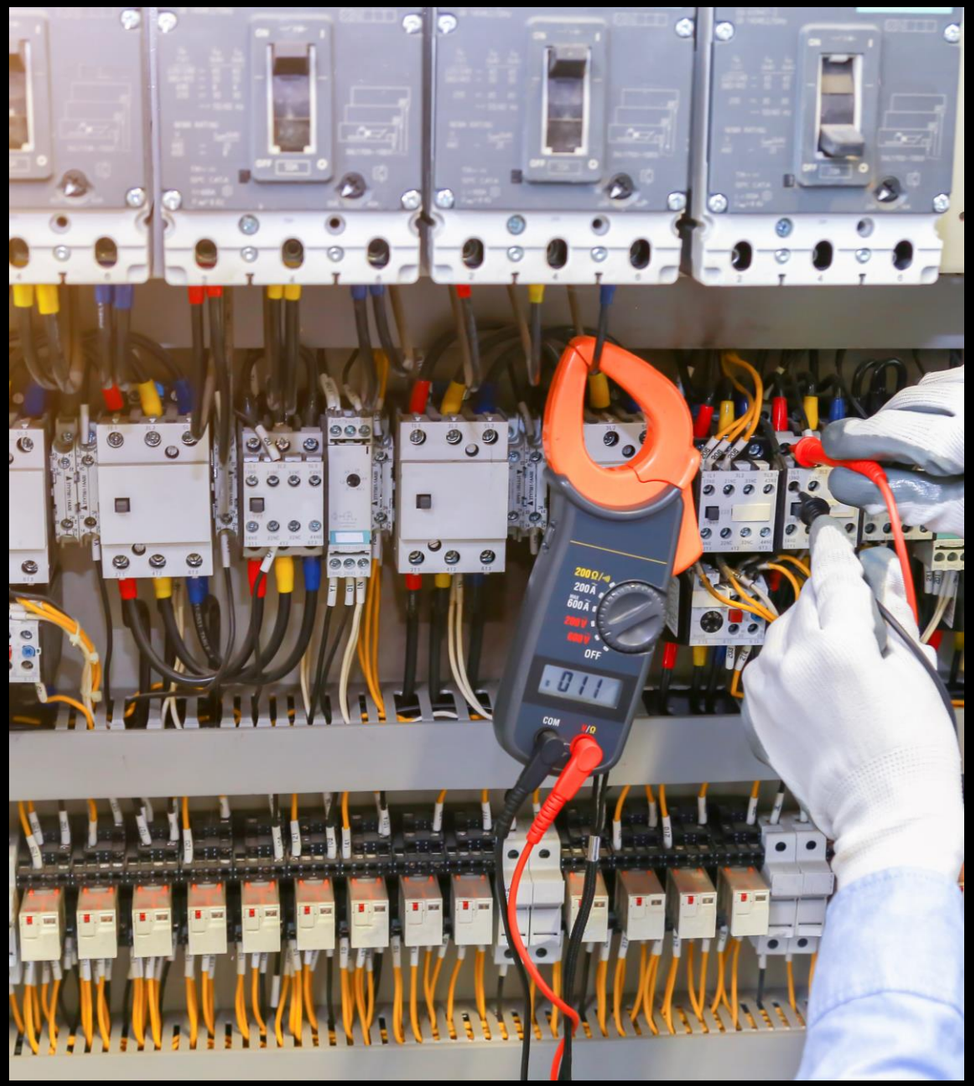
- What tier is your service?
- What happens when you fail?
- How do you know?



AWS Reliability Pillar

Design interactions in distributed system to mitigate or withstand failures

- Caching, throttling
- Graceful degradation
- Circuit breakers
- Contingencies



Failure patterns

Know or assume?

- Retry storm / stampeding herd
- Cache failure



High velocity events

Reactive actions

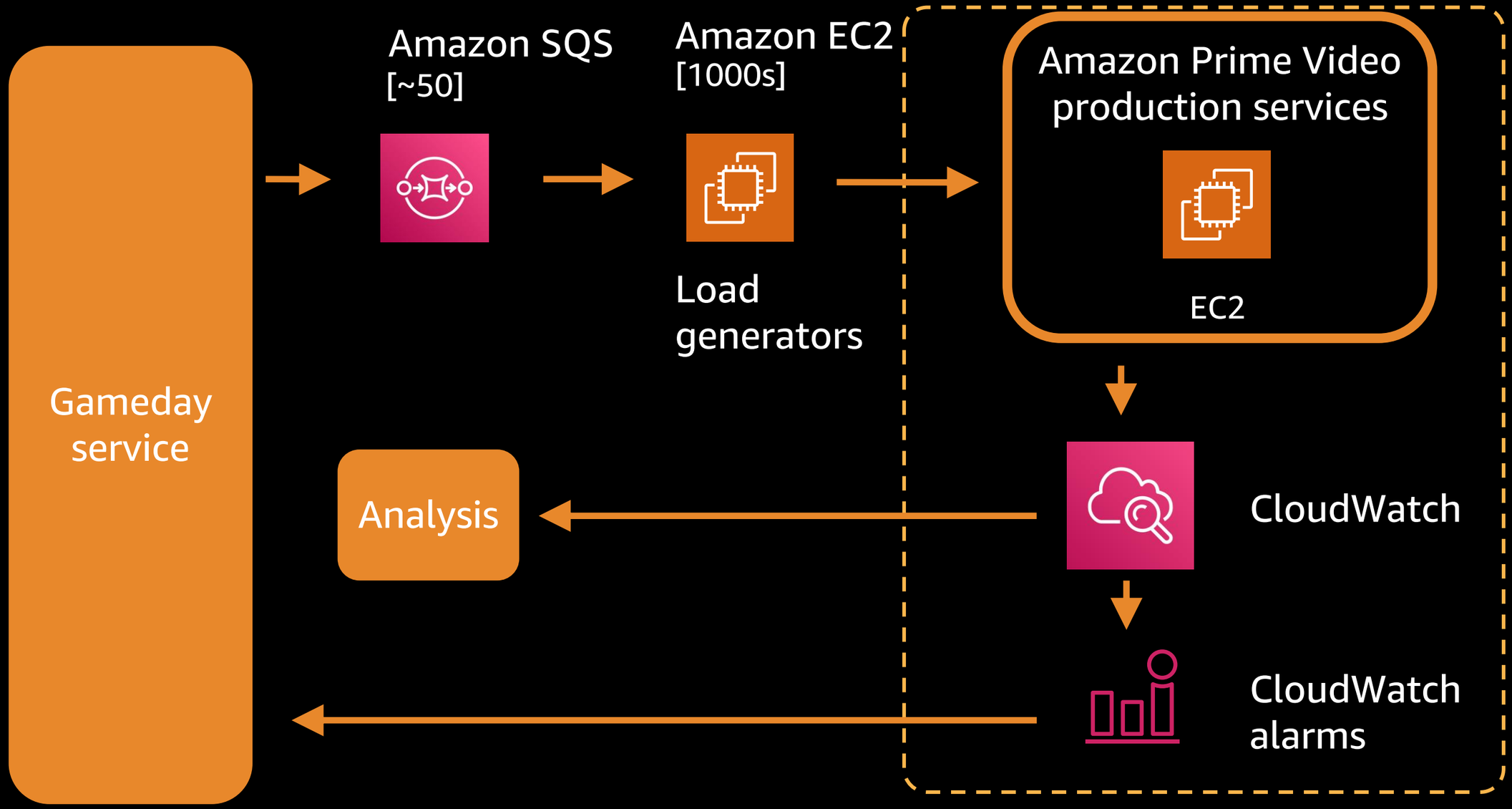
- Contingencies and mitigation levers

Proactive protection

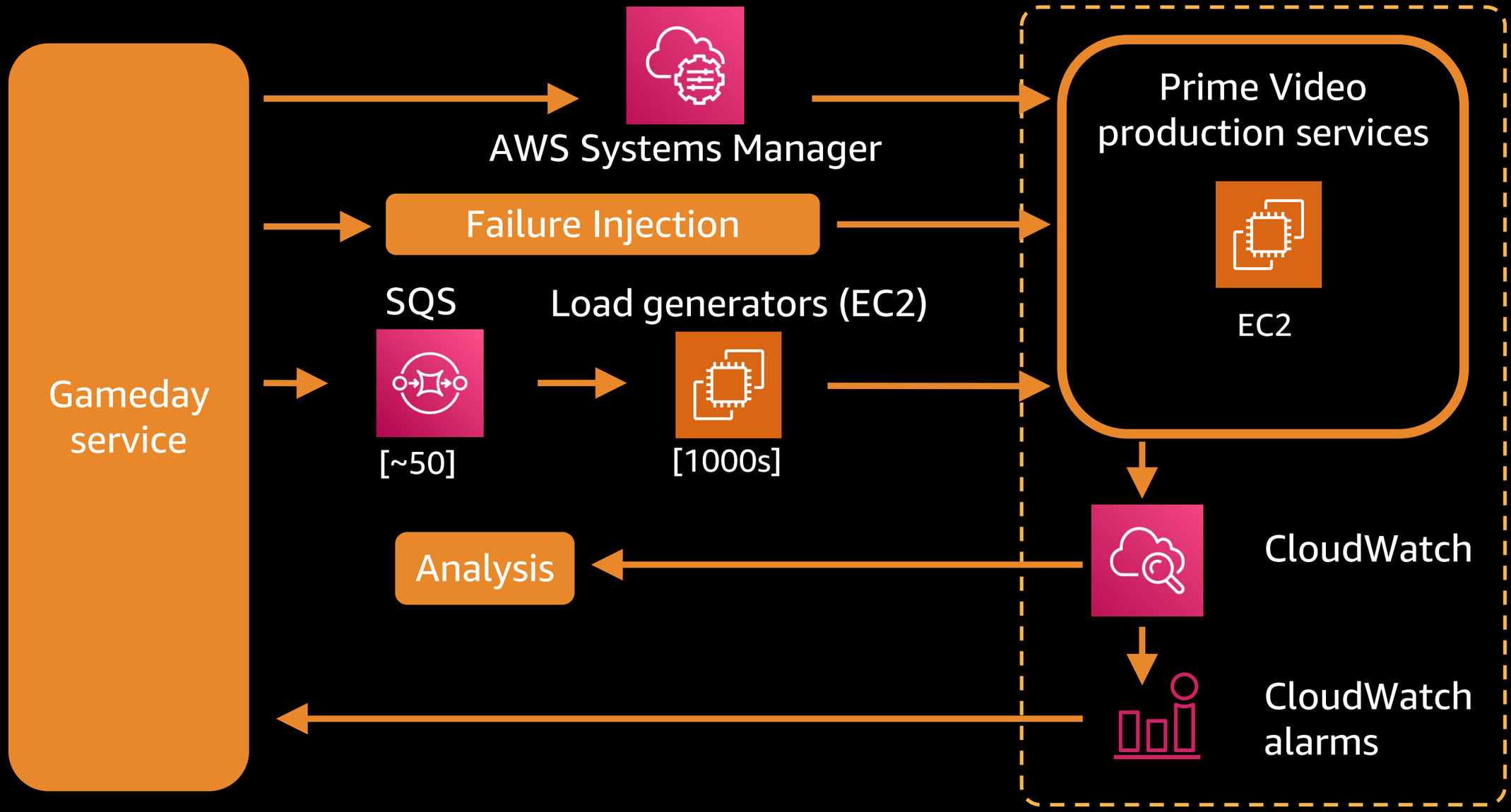
- Capabilities to shield downstreams
- Control by title, marketplace, customer group



Gamedays


Amazon SQS
[~50]
Amazon EC2
[1000s]
Load
generators
Amazon Prime Video
production services
EC2
Gameday
service
Analysis
CloudWatch
CloudWatch
alarms

Automating failures

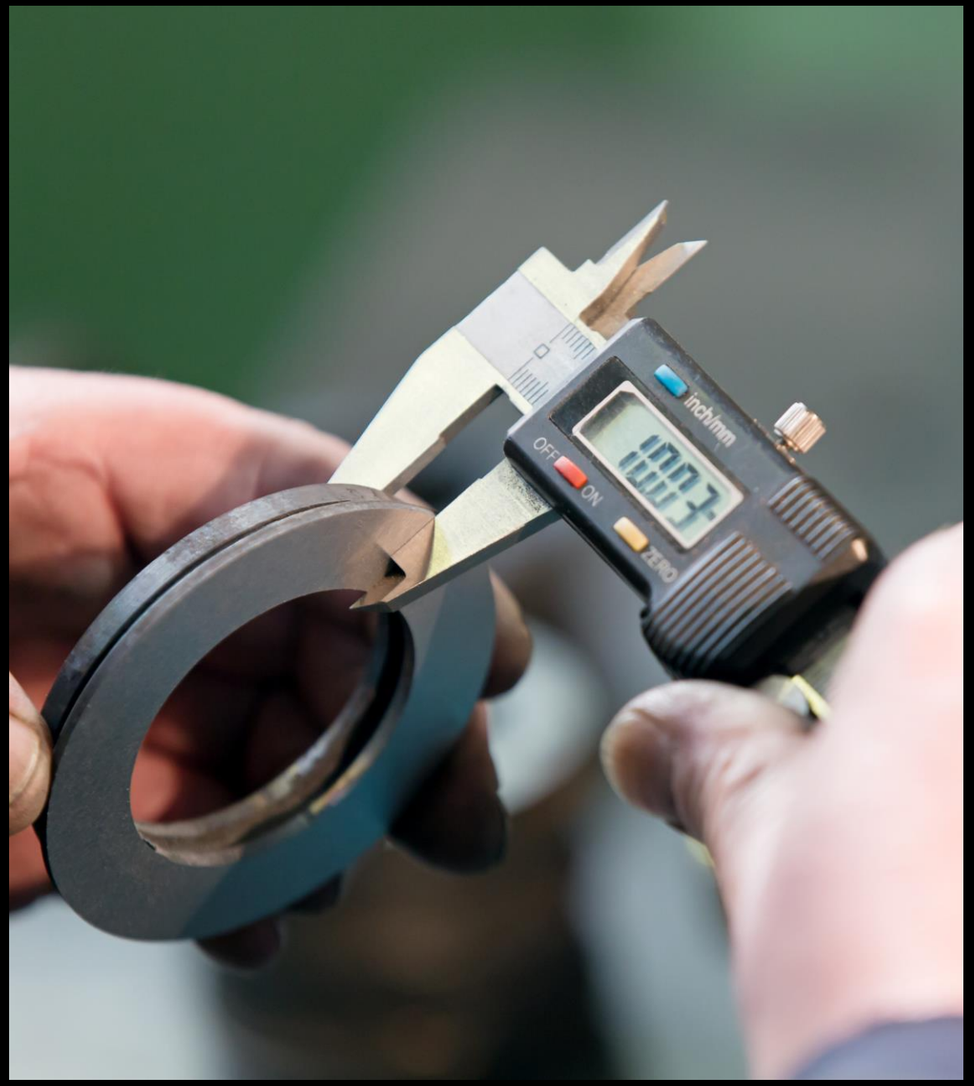


Failure scenarios

Success conditions:

Pass required	e.g., latency +10ms
Fails if occurs	e.g., errors > 5%

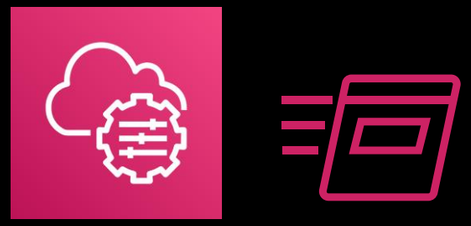
Amazon CloudWatch



Safety first

Put everything back after:

- Cancel when the unexpected occurs
- Finally when you wrap up every time



AWS Systems Manager



Where next?



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Beyond Prime Video

- Chaos community
- Common failure patterns
- Build and share learning
- SSMChaosRunner



Think big

- Why can’t we run failure scenarios for every deployment?
- Spin up a system “slice” – test and bring online
- How do we not impact customers?



Learnings

- *Intentionally fail to reduce availability risks*
- Experiment in test; validate in production
- Plan out a journey
- Not failing is hiding failure!
- Have fun!



Q&A



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Thank you!

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