Reliability in a world of Endless Surprise

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Will your next change **break production**?

How do you know if your distributed system **will work**?

What do you know?

Fallibalism

https://en.wikipedia.org/wiki/Fallibilism
https://de.wikipedia.org/wiki/Fallibilismus

"people cannot attain absolute certainty concerning questions of fact."

-   *Chales S Pierce*

What **do** you know?

- Code
- Hardware
- Networking
- Expected Inputs
- Expected Outputs

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"No one human can understand it anymore -- it is networks of humans."

-   *Jessica Kerr*

What **do** you know?

A mental model.

"All models are wrong but some are useful."

-   *George Box*

What if you **did** know the **full** system?

Computers are just machines!

What would you **become**?

An intellect which at a certain moment would know all forces that set nature in motion, and all positions of all items of which nature is composed, if this intellect were also vast enough to submit these data to analysis, it would embrace in a single formula the movements of the greatest bodies of the universe and those of the tiniest atom; for such an intellect nothing would be uncertain and the future just like the past would be present before its eyes.

— Pierre Simon Laplace, *A Philosophical Essay on Probabilities*

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Impossible!

In 2008, David Wolpert used Cantor diagonalization to disprove Laplace's demon.

https://en.wikipedia.org/wiki/Laplace's_demon

Chaos Theory!

What about testing?

"Testing shows the presence, not the absence of bugs."

-   Edsger W Dijkstra

What about **Chaos Engineering**?

"An unlikely event is likely to happen because there are so many unlikely events that can happen."

– *Per Bak*

So what can we do?

In general, **freedom** and **rapid recovery** is better than trying to **prevent error**. We are in a creative business, not a safety-critical business.

-   *jobs.netflix.com/culture*

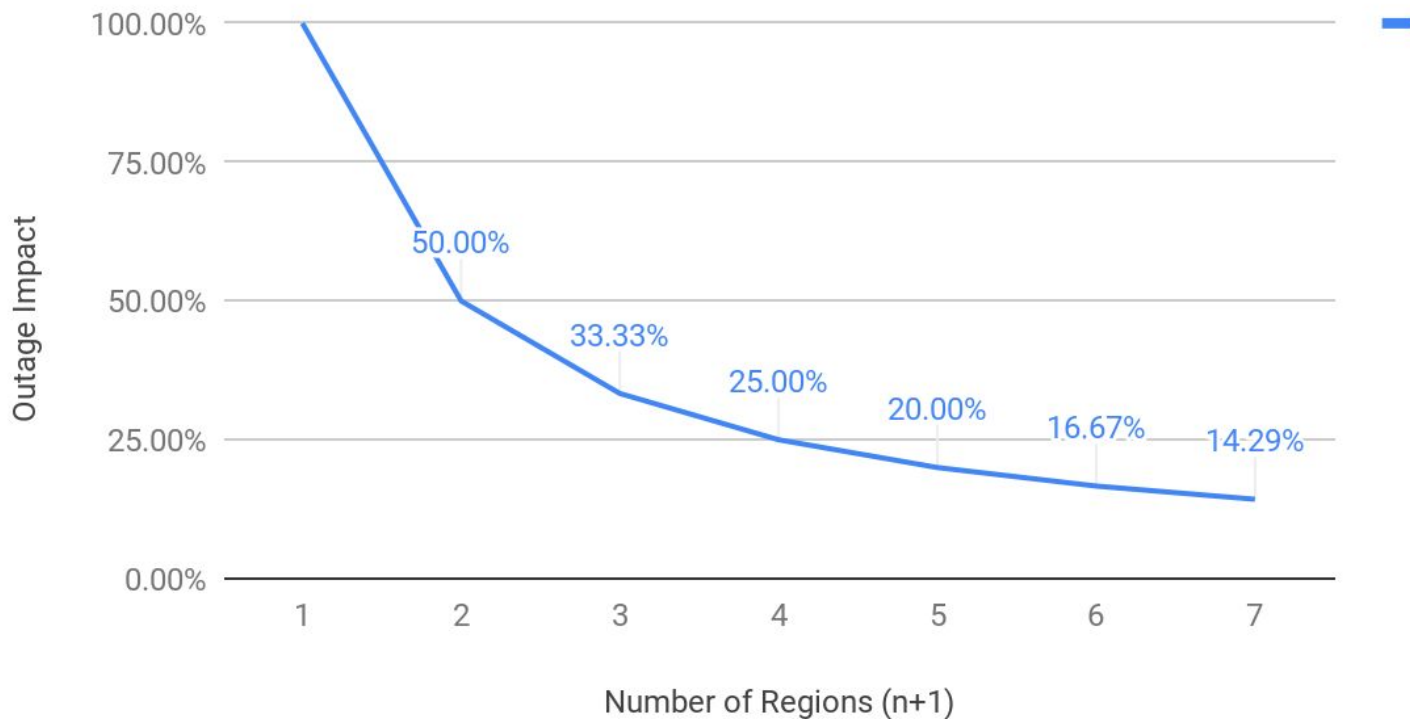# Isolation & Rapid Recovery

Isolation

Divide prod **vertically** into **independent** parts.

"The power to touch is the power to kill."

–   Unknown Programmer

Fault Domain Size

Impact of losing a region

Outage Impact (y-axis)

- 100.00%
- 75.00%
- 50.00%
- 25.00%
- 0.00%

Data points:
- 1 → 100.00%
- 2 → 50.00%
- 3 → 33.33%
- 4 → 25.00%
- 5 → 20.00%
- 6 → 16.67%
- 7 → 14.29%

Number of Regions (n+1)

Rapid Recovery

Beyond deploys.

- Configuration Changes
- Data Changes
  - Beware Caches!
- Networking
- A/B Tests
- Feature Flags

Thank
You!

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