

Operations First, Feature Second Philosophy

Lessons Learned at Facebook

Najam Ahmad
NANOG 73, June 2018

**Skills network engineers
need in the future?**

virtualization
hyper-converged
systems!?

linux

internet based
networking in the cloud

multi-cloud
architecture

saas



soft skills

automate or die

IOT

SD WAN

cloud

application analysis

API not CLI

A world map is centered in the background, rendered in a light yellowish-green color. Overlaid on the map is a complex network of thin, light blue lines that connect various points across the continents, suggesting a global network or data flow. The entire background is a solid dark blue.

Scale

A close-up photograph of a person's hand holding a dark-colored smartphone. The hand is positioned diagonally across the frame. A silver-colored ring is visible on the ring finger. The background is blurred, showing hints of other people and colors like blue and red. Overlaid on the image is large white text and smaller blue text.

2.2 billion

monthly active users

A hand holding a smartphone, with a dark, semi-transparent overlay covering the entire image. The text '300+ million' is prominently displayed in white, with 'photo uploads per day' in blue below it.

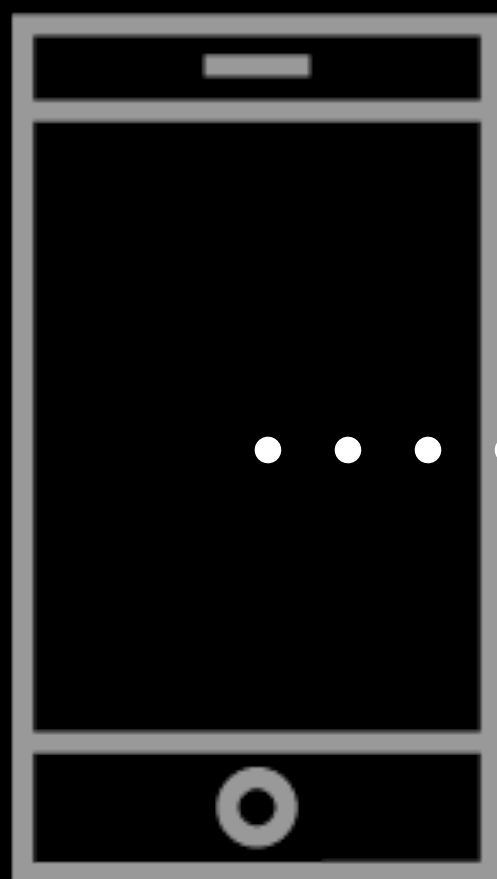
300+ million

photo uploads per day

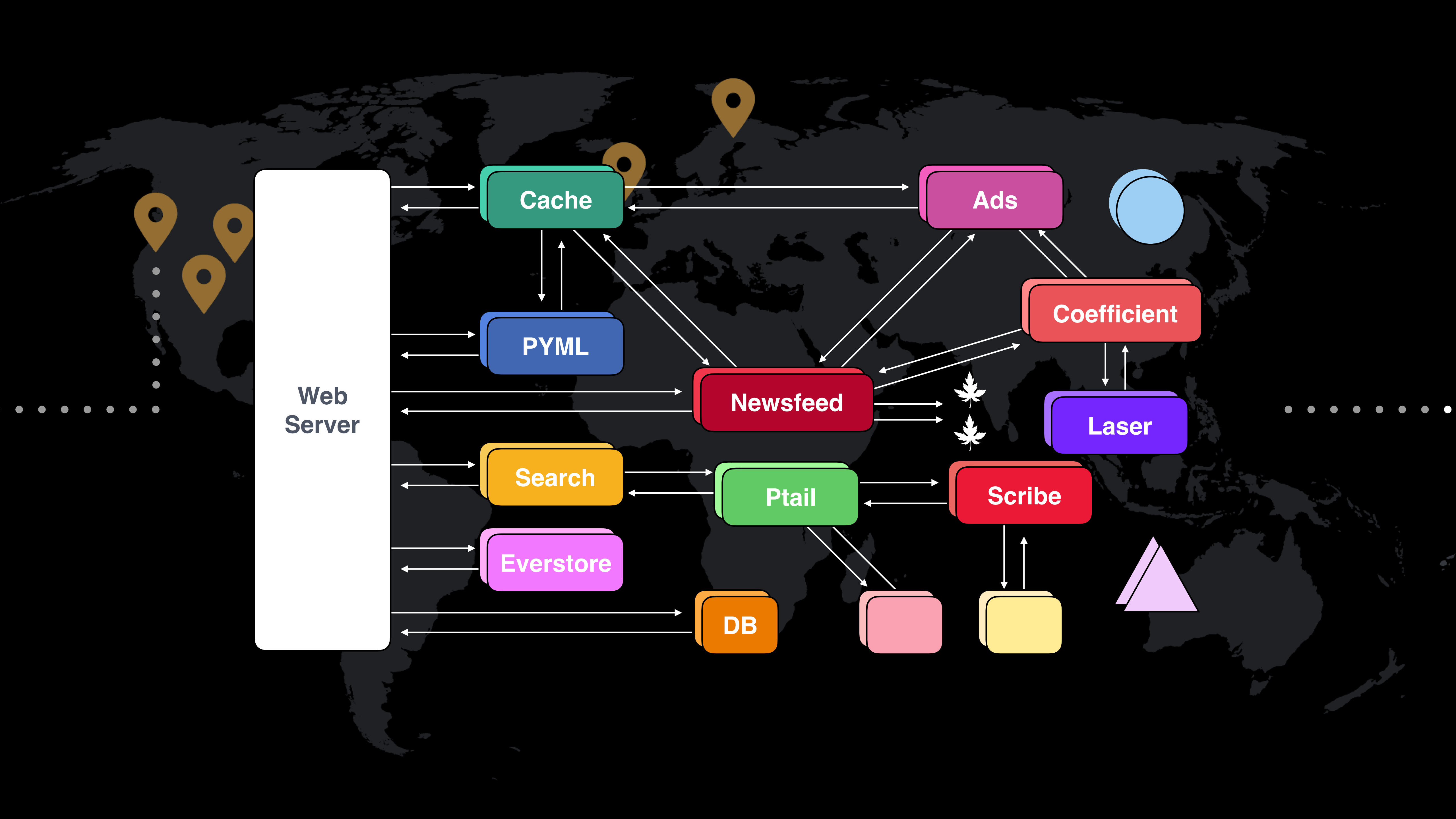
A hand holding a pen over a document with a yellow highlighter mark.

1+ million

comments, status updates, and posts per minute









Operations First Mindset!

Automation



**Engineers build robots,
robots manage the network**







**Automation alone doesn't
get you there!**

**Think operations first,
features second**

Failproof vs Failfast

(detect quickly, mitigate in 1 sec or less)

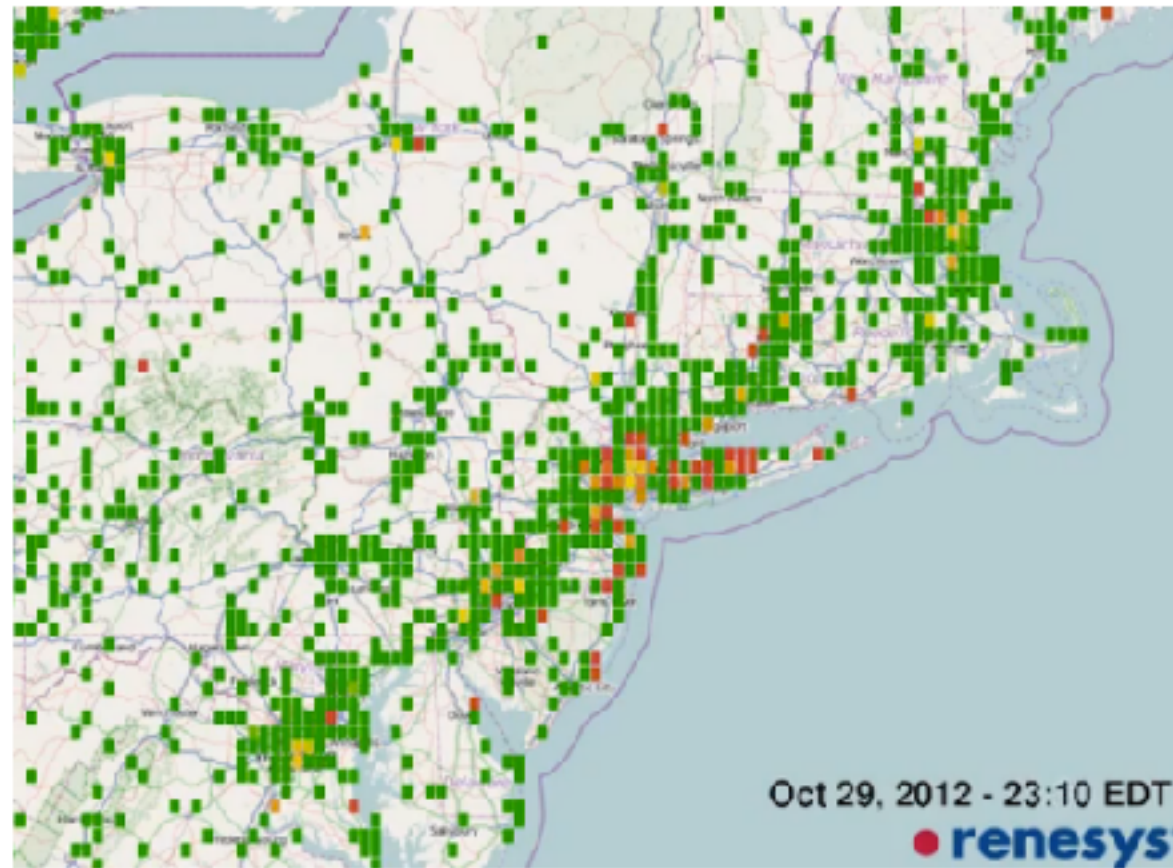
Iterate vs Architect

Don't perpetuate or create “legacy”

WIRED

ROBERT MCMILLAN BUSINESS 11.01.12 11:09 AM

ANIMATION: HURRICANE SANDY WIPES OUT 10 PERCENT OF NEW YORK'S INTERNET



 **REUTERS**

TECHNOLOGY NEWS | Tue Oct 30, 2012 5:38pm EDT

Hurricane Sandy disrupts Northeast U.S. telecom networks



A man walks through floodwaters in the Rockaways section of New York, October 30, 2012. REUTERS/Kelth Bedford

MIT Technology Review

How Hurricane Sandy Knocked Out East Coast Internet Connectivity

A video shows hurricane taking out communications as it
makes landfall.

November 1, 2012

NEW YORK POST

BUSINESS

Flooding, power outages from Hurricane Sandy lead to Internet, phone service disruptions

By Post Staff Report

October 30, 2012 7:55am

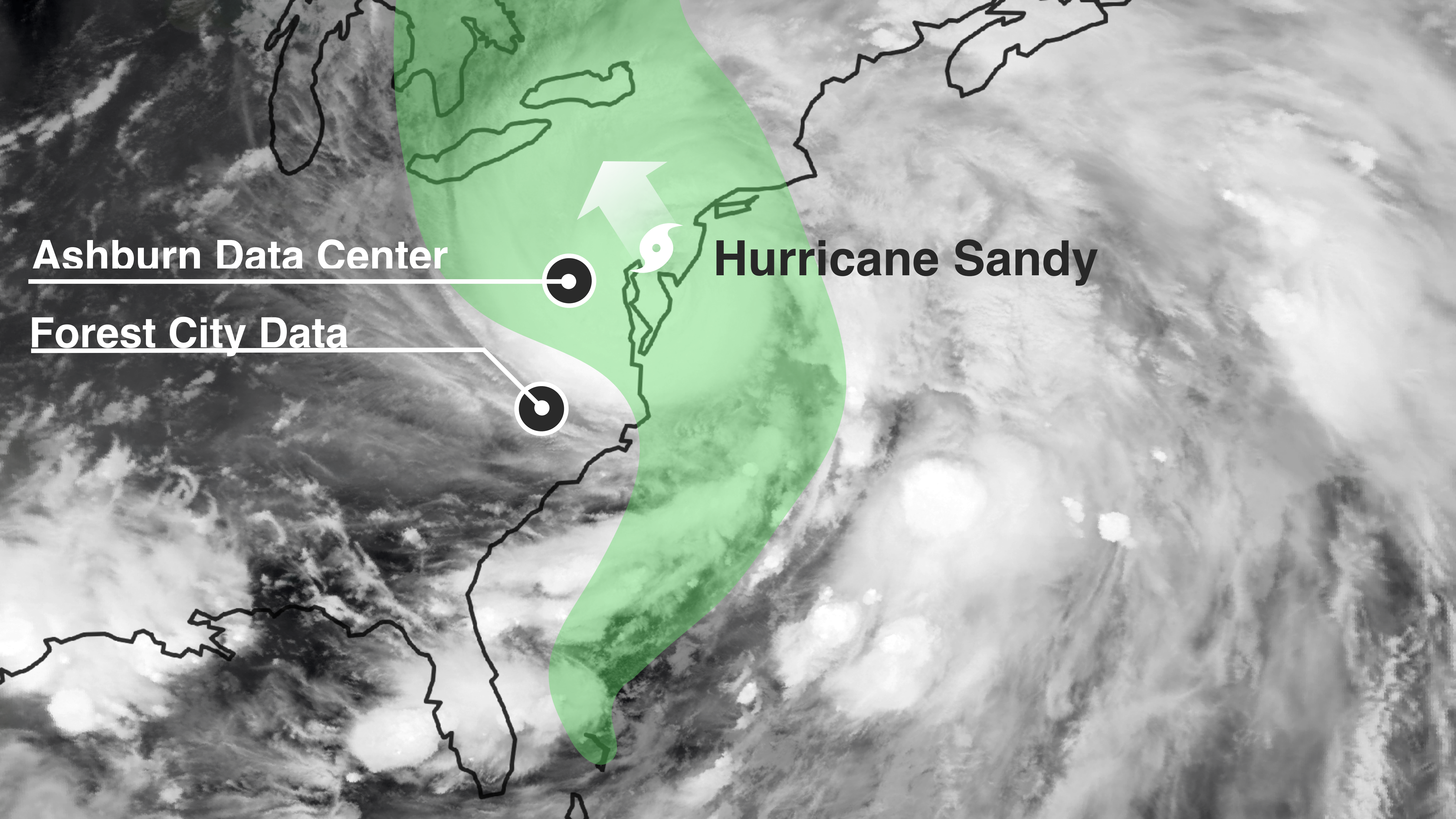


The lobby of Verizon's Corporate headquarters in Manhattan under water on Monday
Photo: Reuters

Ashburn Data Center

Forest City Data

Hurricane Sandy



A black and white photograph of a server room. The room is filled with rows of server racks, each containing numerous circuit boards and components. The racks are arranged in a long aisle, with a polished floor reflecting the overhead lights. The perspective is from the end of the aisle, looking down its length. The text is overlaid on the image in a large, white, sans-serif font.

100s of Tb/s

10s of Megawatts

Thousands of software services

Leased Data

Forest City Data

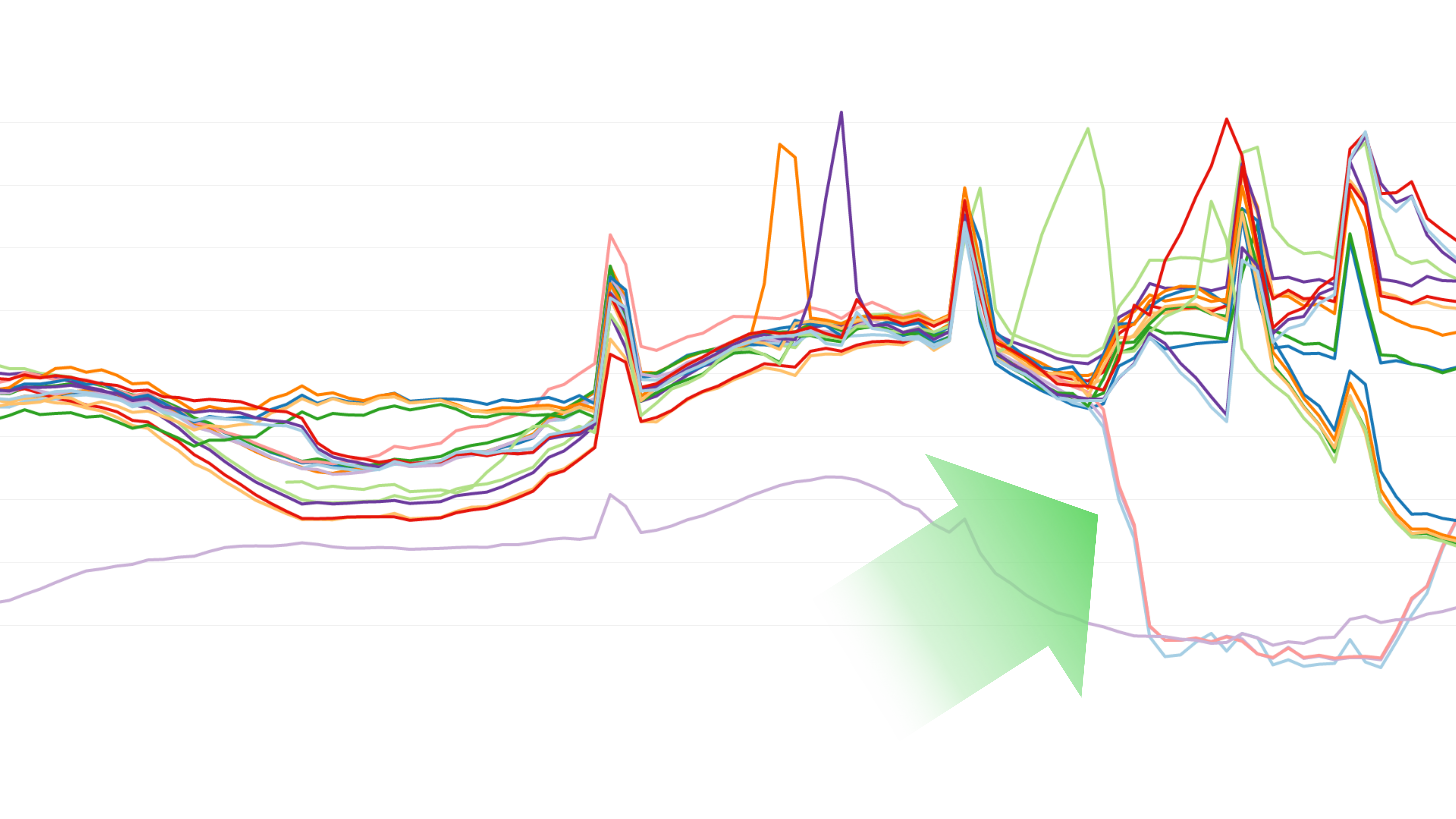
**Can we run Facebook without
one of our data center regions?**

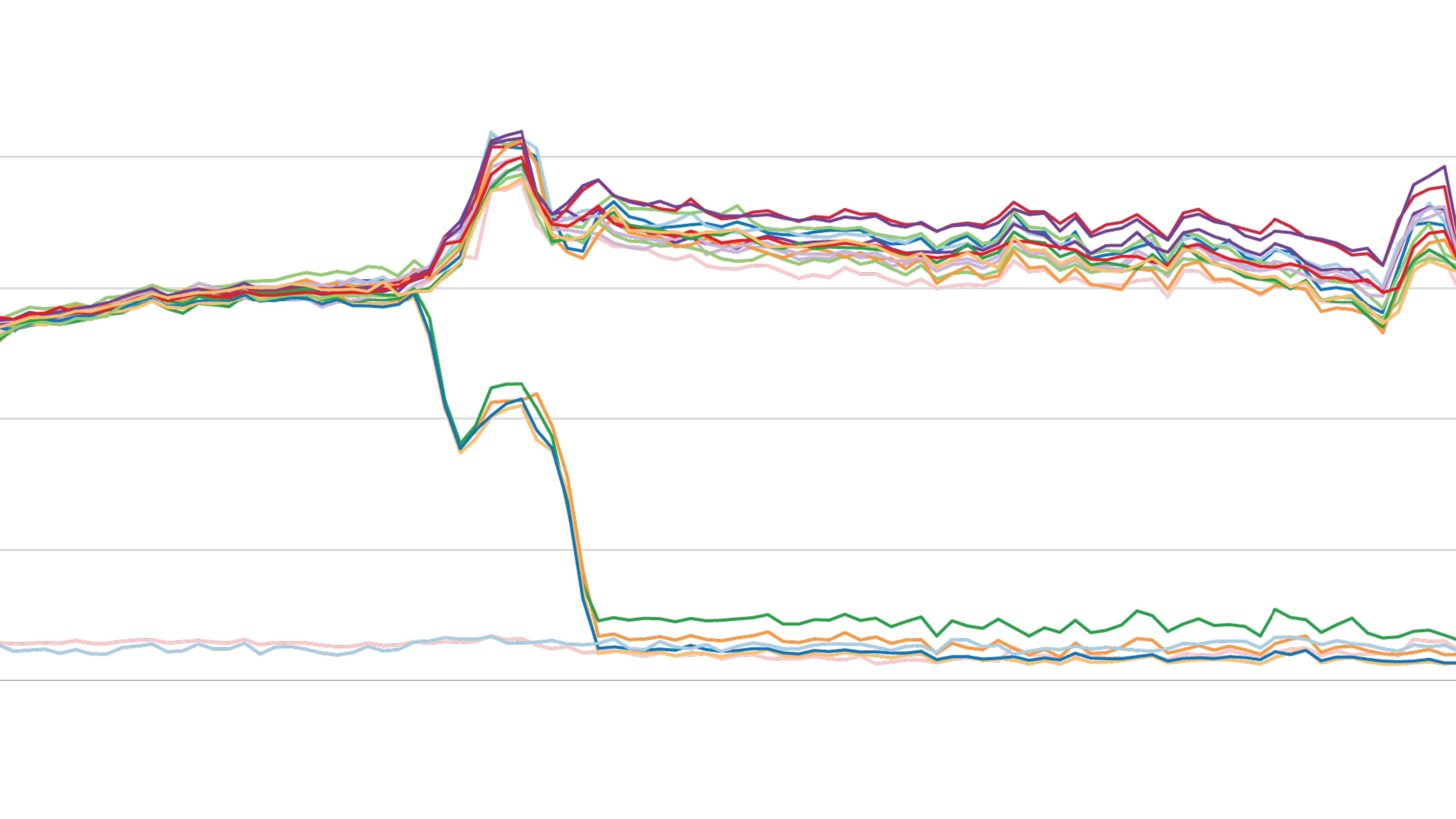


Sandstorm

OCT 2012 - JUN 2014

ID		Name		Type		Status		Date		Author		Reviewer		Comments		Action	
001	Project Alpha	John Doe	2023-01-15	Active	Project Alpha	Project Alpha	Project Alpha	2023-01-15	2023-01-15	John Doe	John Doe	John Doe	John Doe	Project Alpha	Project Alpha	Project Alpha	Project Alpha
002	Project Beta	Jane Smith	2023-01-16	Active	Project Beta	Project Beta	Project Beta	2023-01-16	2023-01-16	Jane Smith	Jane Smith	Jane Smith	Jane Smith	Project Beta	Project Beta	Project Beta	Project Beta
003	Project Gamma	Mike Johnson	2023-01-17	Active	Project Gamma	Project Gamma	Project Gamma	2023-01-17	2023-01-17	Mike Johnson	Mike Johnson	Mike Johnson	Mike Johnson	Project Gamma	Project Gamma	Project Gamma	Project Gamma
004	Project Delta	Sarah Brown	2023-01-18	Active	Project Delta	Project Delta	Project Delta	2023-01-18	2023-01-18	Sarah Brown	Sarah Brown	Sarah Brown	Sarah Brown	Project Delta	Project Delta	Project Delta	Project Delta
005	Project Epsilon	David Wilson	2023-01-19	Active	Project Epsilon	Project Epsilon	Project Epsilon	2023-01-19	2023-01-19	David Wilson	David Wilson	David Wilson	David Wilson	Project Epsilon	Project Epsilon	Project Epsilon	Project Epsilon
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007	Project Eta	Chris Miller	2023-01-21	Active	Project Eta	Project Eta	Project Eta	2023-01-21	2023-01-21	Chris Miller	Chris Miller	Chris Miller	Chris Miller	Project Eta	Project Eta	Project Eta	Project Eta
008	Project Theta	Alice Taylor	2023-01-22	Active	Project Theta	Project Theta	Project Theta	2023-01-22	2023-01-22	Alice Taylor	Alice Taylor	Alice Taylor	Alice Taylor	Project Theta	Project Theta	Project Theta	Project Theta
009	Project Iota	Bob White	2023-01-23	Active	Project Iota	Project Iota	Project Iota	2023-01-23	2023-01-23	Bob White	Bob White	Bob White	Bob White	Project Iota	Project Iota	Project Iota	Project Iota
010	Project Kappa	Charlie Black	2023-01-24	Active	Project Kappa	Project Kappa	Project Kappa	2023-01-24	2023-01-24	Charlie Black	Charlie Black	Charlie Black	Charlie Black	Project Kappa	Project Kappa	Project Kappa	Project Kappa
011	Project Lambda	Diana Green	2023-01-25	Active	Project Lambda	Project Lambda	Project Lambda	2023-01-25	2023-01-25	Diana Green	Diana Green	Diana Green	Diana Green	Project Lambda	Project Lambda	Project Lambda	Project Lambda
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013	Project Nu	Grace White	2023-01-27	Active	Project Nu	Project Nu	Project Nu	2023-01-27	2023-01-27	Grace White	Grace White	Grace White	Grace White	Project Nu	Project Nu	Project Nu	Project Nu
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015	Project Omicron	Ivy Green	2023-01-29	Active	Project Omicron	Project Omicron	Project Omicron	2023-01-29	2023-01-29	Ivy Green	Ivy Green	Ivy Green	Ivy Green	Project Omicron	Project Omicron	Project Omicron	Project Omicron
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017	Project Rho	Karen Black	2023-01-31	Active	Project Rho	Project Rho	Project Rho	2023-01-31	2023-01-31	Karen Black	Karen Black	Karen Black	Karen Black	Project Rho	Project Rho	Project Rho	Project Rho
018	Project Sigma	Leo Green	2023-02-01	Active	Project Sigma	Project Sigma	Project Sigma	2023-02-01	2023-02-01	Leo Green	Leo Green	Leo Green	Leo Green	Project Sigma	Project Sigma	Project Sigma	Project Sigma
019	Project Tau	Mia White	2023-02-02	Active	Project Tau	Project Tau	Project Tau	2023-02-02	2023-02-02	Mia White	Mia White	Mia White	Mia White	Project Tau	Project Tau	Project Tau	Project Tau
020	Project Upsilon	Noah Black	2023-02-03	Active	Project Upsilon	Project Upsilon	Project Upsilon	2023-02-03	2023-02-03	Noah Black	Noah Black	Noah Black	Noah Black	Project Upsilon	Project Upsilon	Project Upsilon	Project Upsilon
021	Project Phi	Olivia Green	2023-02-04	Active	Project Phi	Project Phi	Project Phi	2023-02-04	2023-02-04	Olivia Green	Olivia Green	Olivia Green	Olivia Green	Project Phi	Project Phi	Project Phi	Project Phi
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028	Project Delta	Victor White	2023-02-11	Active	Project Delta	Project Delta	Project Delta	2023-02-11	2023-02-11	Victor White	Victor White	Victor White	Victor White	Project Delta	Project Delta	Project Delta	Project Delta
029	Project Epsilon	Wendy Black	2023-02-12	Active	Project Epsilon	Project Epsilon	Project Epsilon	2023-02-12	2023-02-12	Wendy Black	Wendy Black	Wendy Black	Wendy Black	Project Epsilon	Project Epsilon	Project Epsilon	Project Epsilon
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031	Project Eta	Yara White	2023-02-14	Active	Project Eta	Project Eta	Project Eta	2023-02-14	2023-02-14	Yara White	Yara White	Yara White	Yara White	Project Eta	Project Eta	Project Eta	Project Eta
032	Project Theta	Zoe Black	2023-02-15	Active	Project Theta	Project Theta	Project Theta	2023-02-15	2023-02-15	Zoe Black	Zoe Black	Zoe Black	Zoe Black	Project Theta	Project Theta	Project Theta	Project Theta
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036	Project Mu	Dora Green	2023-02-19	Active	Project Mu	Project Mu	Project Mu	2023-02-19	2023-02-19	Dora Green	Dora Green	Dora Green	Dora Green	Project Mu	Project Mu	Project Mu	Project Mu
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039	Project Omicron	Gavin Green	2023-02-22	Active	Project Omicron	Project Omicron	Project Omicron	2023-02-22	2023-02-22	Gavin Green	Gavin Green	Gavin Green	Gavin Green	Project Omicron	Project Omicron	Project Omicron	Project Omicron
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053	Project Epsilon	Uma Black	2023-03-07	Active	Project Epsilon	Project Epsilon	Project Epsilon	2023-03-07	2023-03-07	Uma Black	Uma Black	Uma Black	Uma Black	Project Epsilon	Project Epsilon	Project Epsilon	Project Epsilon
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062	Project Xi	Dora Black	2023-03-16	Active	Project Xi	Project Xi	Project Xi	2023-03-16	2023-03-16	Dora Black	Dora Black	Dora Black	Dora Black	Project Xi	Project Xi	Project Xi	Project Xi
063	Project Omicron	Ethan Green	2023-03-17	Active	Project Omicron	Project Omicron	Project Omicron	2023-03-17	2023-03-17	Ethan Green	Ethan Green	Ethan Green	Ethan Green	Project Omicron	Project Omicron	Project Omicron	Project Omicron
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065	Project Rho	Gavin Black	2023-03-19	Active	Project Rho	Project Rho	Project Rho	2023-03-19	2023-03-19	Gavin Black	Gavin Black	Gavin Black	Gavin Black	Project Rho	Project Rho	Project Rho	Project Rho
066	Project Sigma	Helen Green	2023-03-20	Active	Project Sigma	Project Sigma	Project Sigma	2023-03-20	2023-03-20	Helen Green	Helen Green	Helen Green	Helen Green	Project Sigma	Project Sigma	Project Sigma	Project Sigma
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068	Project Upsilon	Jane Black	2023-03-22	Active	Project Upsilon	Project Upsilon	Project Upsilon	2023-03-22	2023-03-22	Jane Black	Jane Black	Jane Black	Jane Black	Project Upsilon	Project Upsilon	Project Upsilon	Project Upsilon
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071	Project Psi	Mia Black	2023-03-25	Active	Project Psi	Project Psi	Project Psi	2023-03-25	2023-03-25	Mia Black	Mia Black	Mia Black	Mia Black	Project Psi	Project Psi	Project Psi	Project Psi
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074	Project Beta	Pamela Black	2023-03-28	Active	Project Beta	Project Beta	Project Beta	2023-03-28	2023-03-28	Pamela Black	Pamela Black	Pamela Black	Pamela Black	Project Beta	Project Beta	Project Beta	Project Beta
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076	Project Delta	Rachel White	2023-03-30	Active	Project Delta	Project Delta	Project Delta	2023-03-30	2023-03-30	Rachel White	Rachel White	Rachel White	Rachel White	Project Delta	Project Delta	Project Delta	Project Delta
077	Project Epsilon</																





A dark, high-contrast photograph of a server room. The image shows rows of server racks filled with equipment, with some racks having their doors open. The lighting is dim, creating a moody atmosphere. The text is overlaid in white, bold font.

Commit

Tooling

Embrace Failure

**WHAT WOULD
YOU DO IF
YOU WEREN'T
AFRAID?**

POSTER BROUGHT TO YOU BY YOUR FRIENDS AT  THE FACEBOOK ANALOG RESEARCH LABORATORY

A vertical panel with a background of a sandstorm, showing swirling orange and yellow sand clouds.

Sandstorm
JUN 2014

A vertical panel with a background of an icestorm, showing thick, layered white and grey ice formations.

Icestorm
JAN 2015

A vertical panel with a background of a thunderstorm, showing dark purple and blue clouds with bright yellow lightning bolts.

Thunderstorm
JUN 2015

A vertical panel with a background of a firestorm, showing intense orange and yellow flames and smoke.

Firestorm
OCT 2015

A vertical panel with a background of a sandstorm, showing swirling orange and yellow sand clouds.

Sandstorm 2
MAY 2016

A vertical panel with a background of a thunderstorm, showing dark purple and blue clouds with bright yellow lightning bolts.

Thunderstorm 2
JUL 2016

A vertical panel with a background of a firestorm, showing intense orange and yellow flames and smoke.

Firestorm 2
OCT 2016



What did we gain?

Learnings, lots of them

Automation

Better app developer behavior

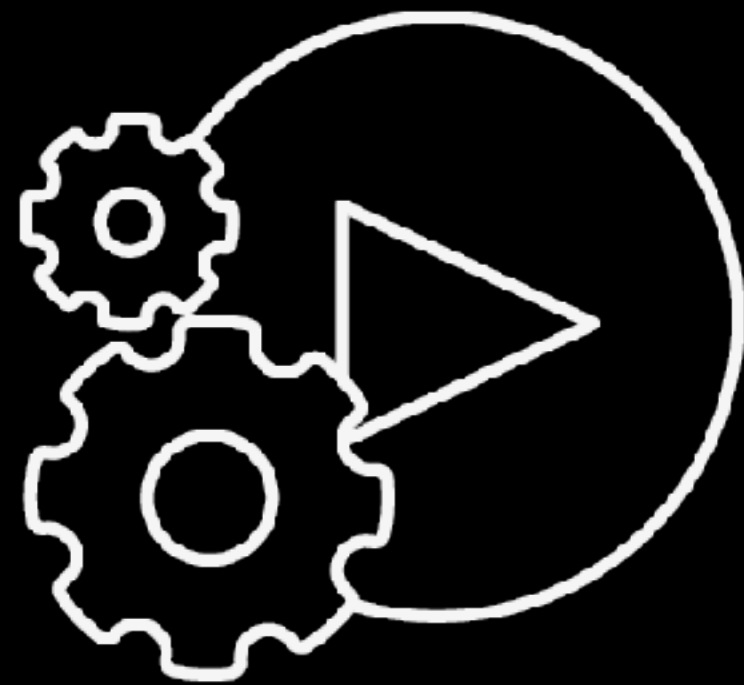
Faster more predictable recovery

Tree Down SEV!

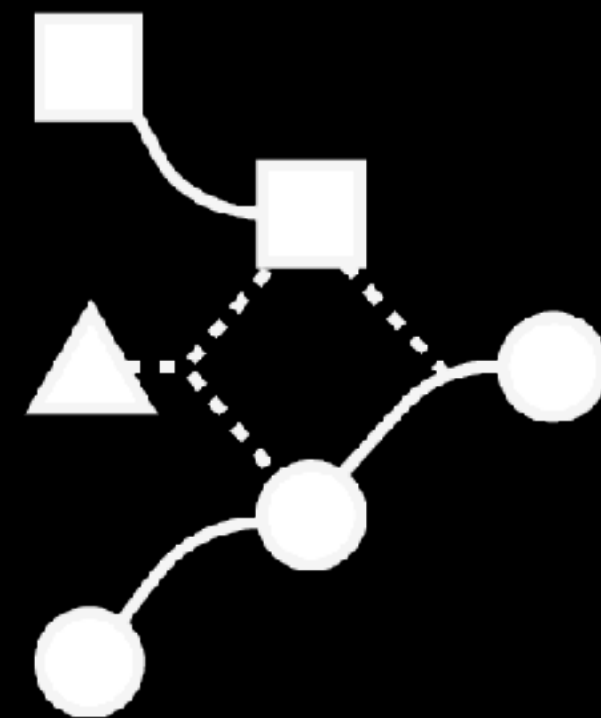
What Next?



To Summarize



Automation



Dependence



Validation

THINK
WRONG

POSTER BROUGHT TO YOU BY YOUR FRIENDS AT  THE FACEBOOK ANALYSIS RESEARCH LABORATORY