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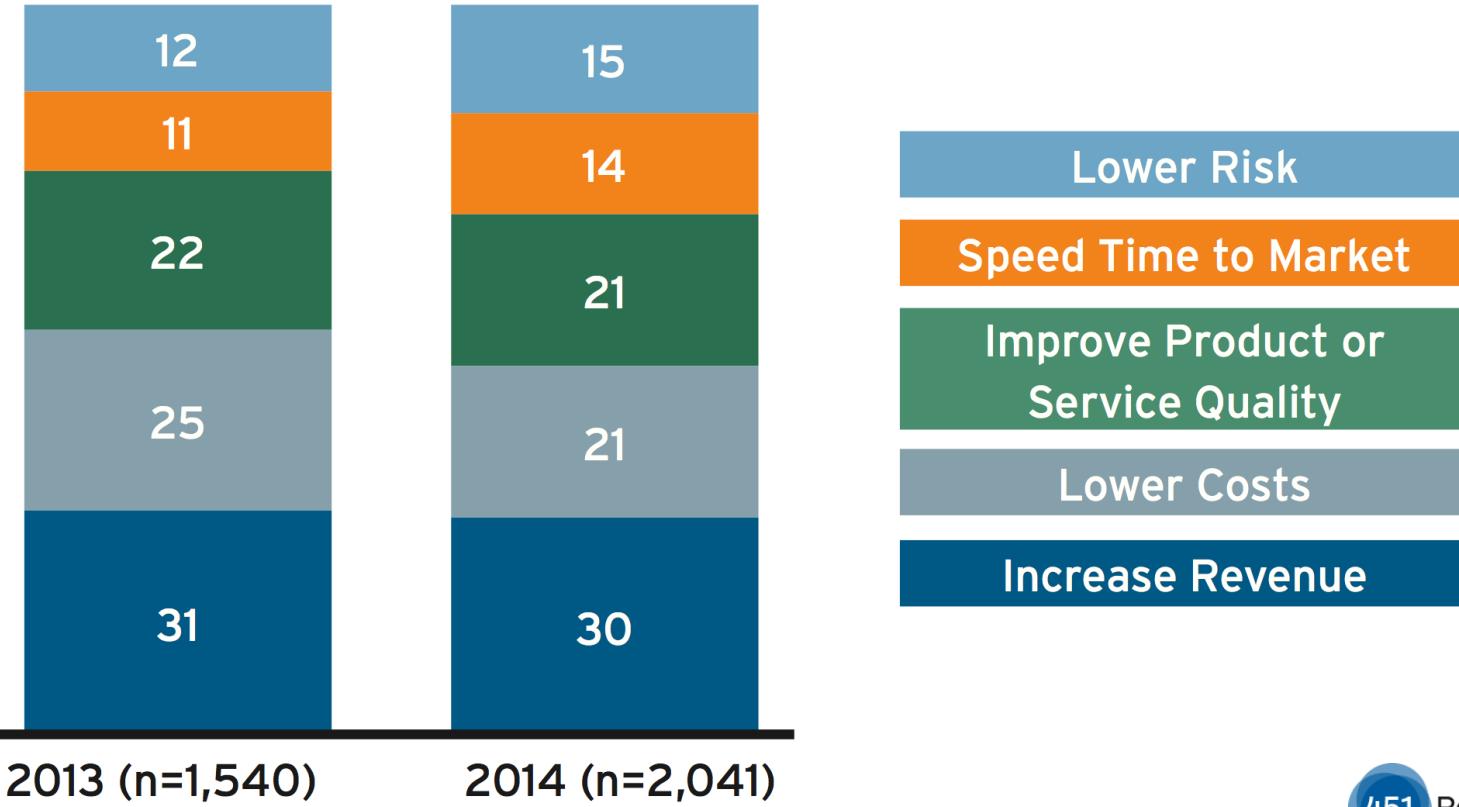
Microservices 101: From DevOps to Docker and beyond

Donnie Berkholz, Ph.D.
Research Director — Development, DevOps, & IT Ops



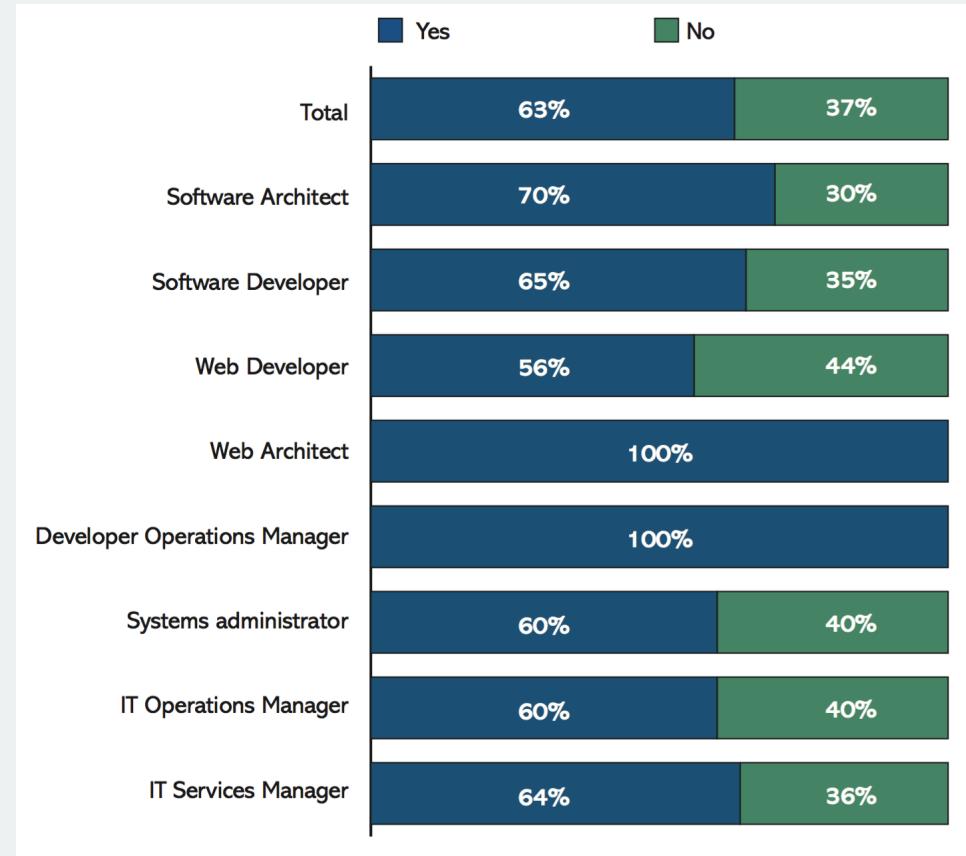
microservices

Minimizing **risk**, maximizing **agility**



The need for speed

63% want more

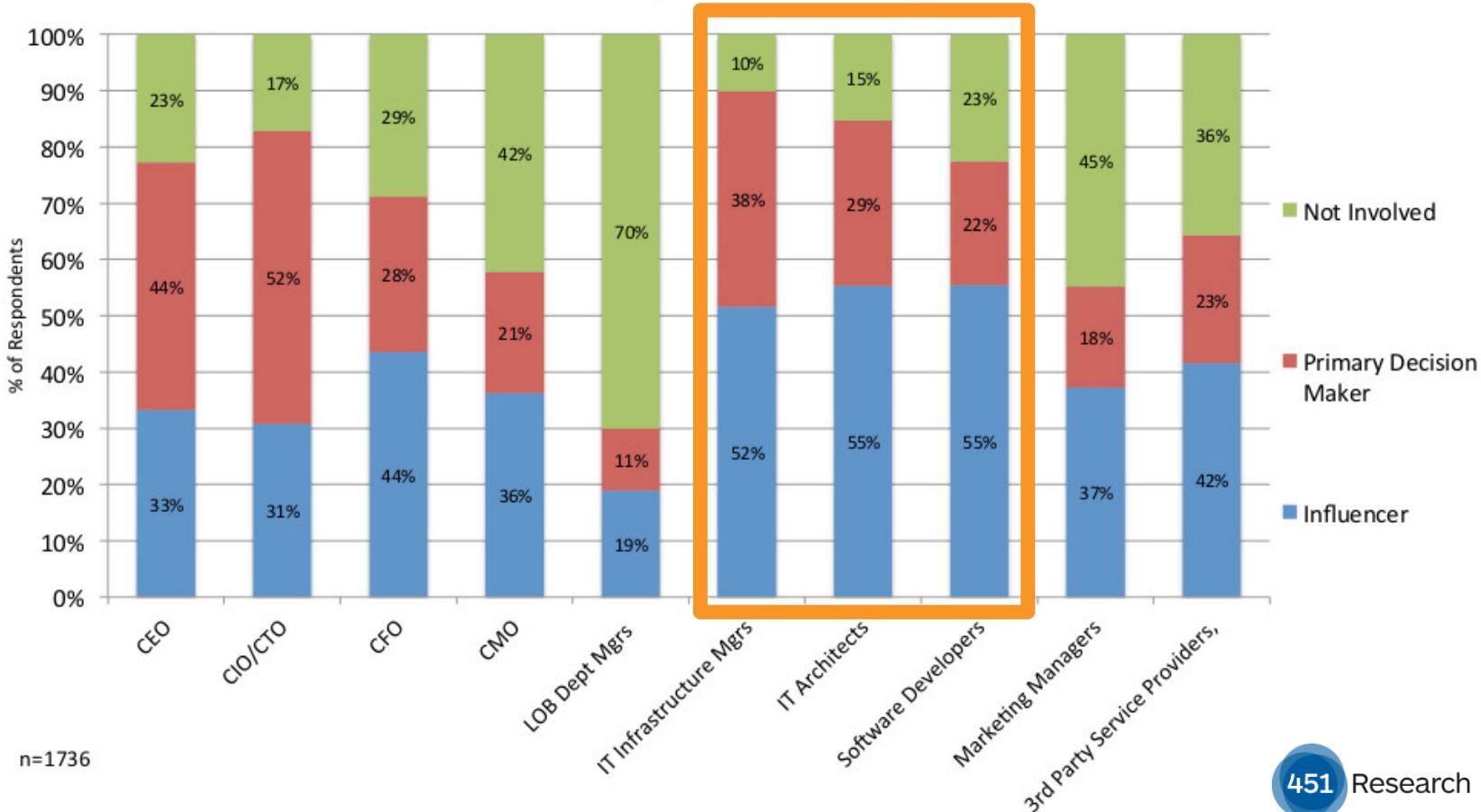




Technology
adoption
is increasingly
bottom-up



Stakeholder Decision Making Authority



n=1736

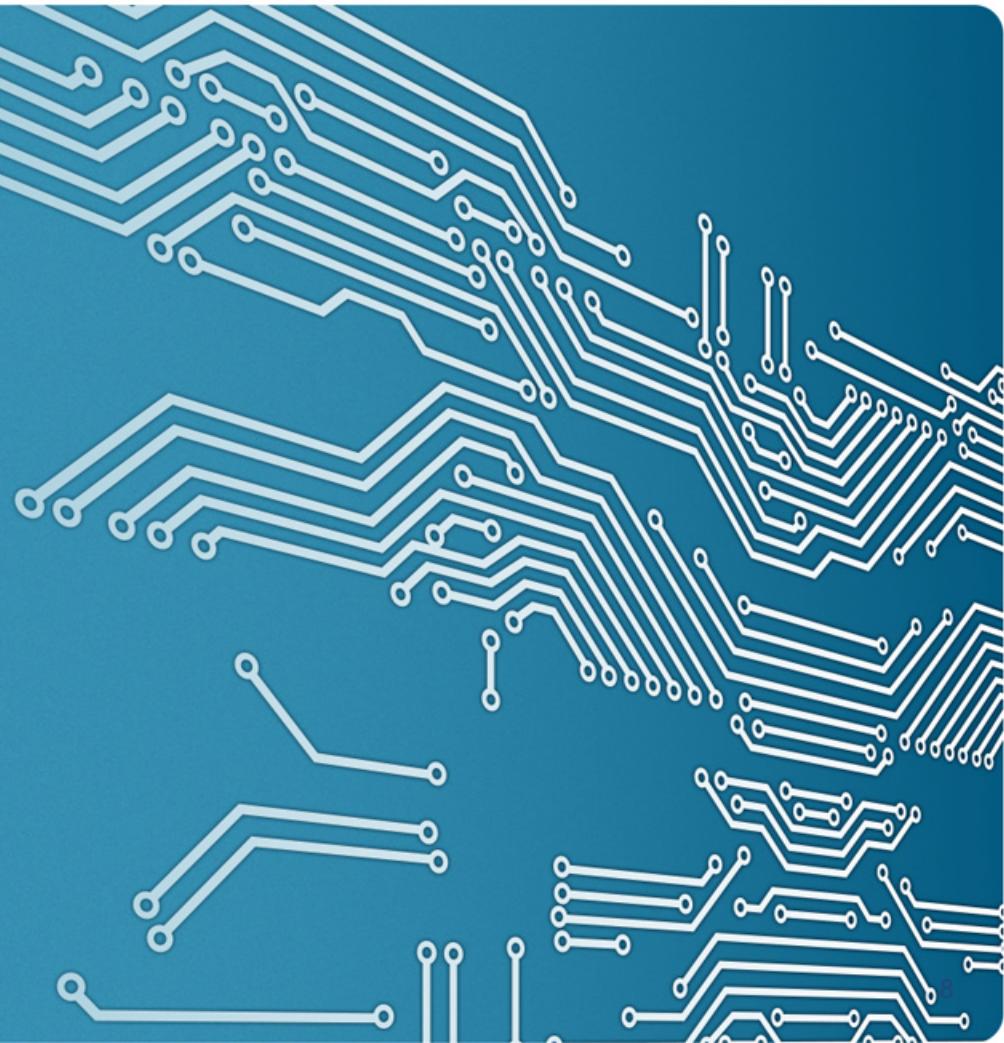
The new stack?

An **infinite** array of possible stacks.

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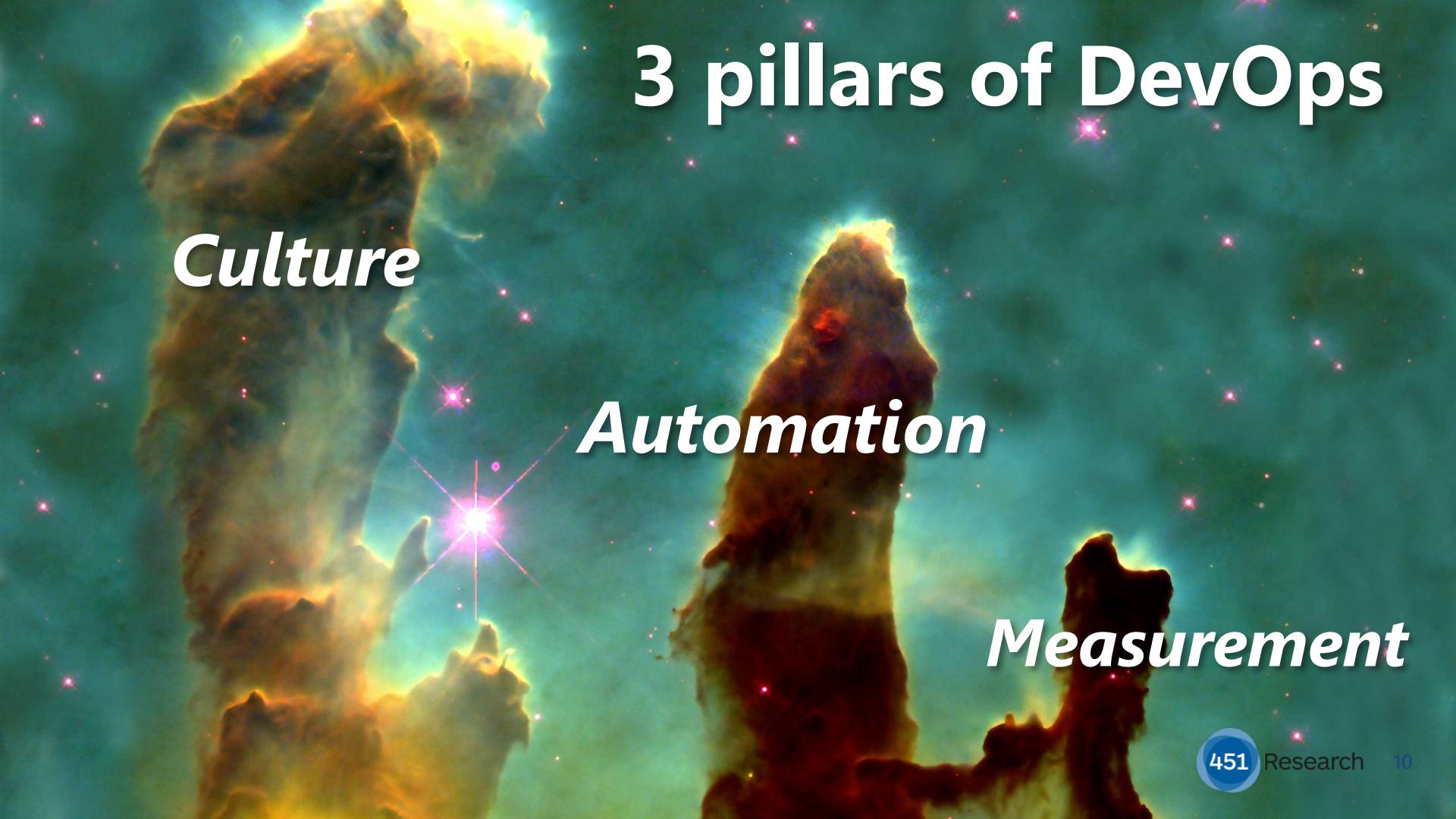
DevOps: Putting IT into high gear



Agile, truly tip to tail



Business to customer

A background image of the Eagle Nebula's Pillars of Creation, showing three prominent, dark, pillar-like structures against a bright, star-filled background.

3 pillars of DevOps

Culture

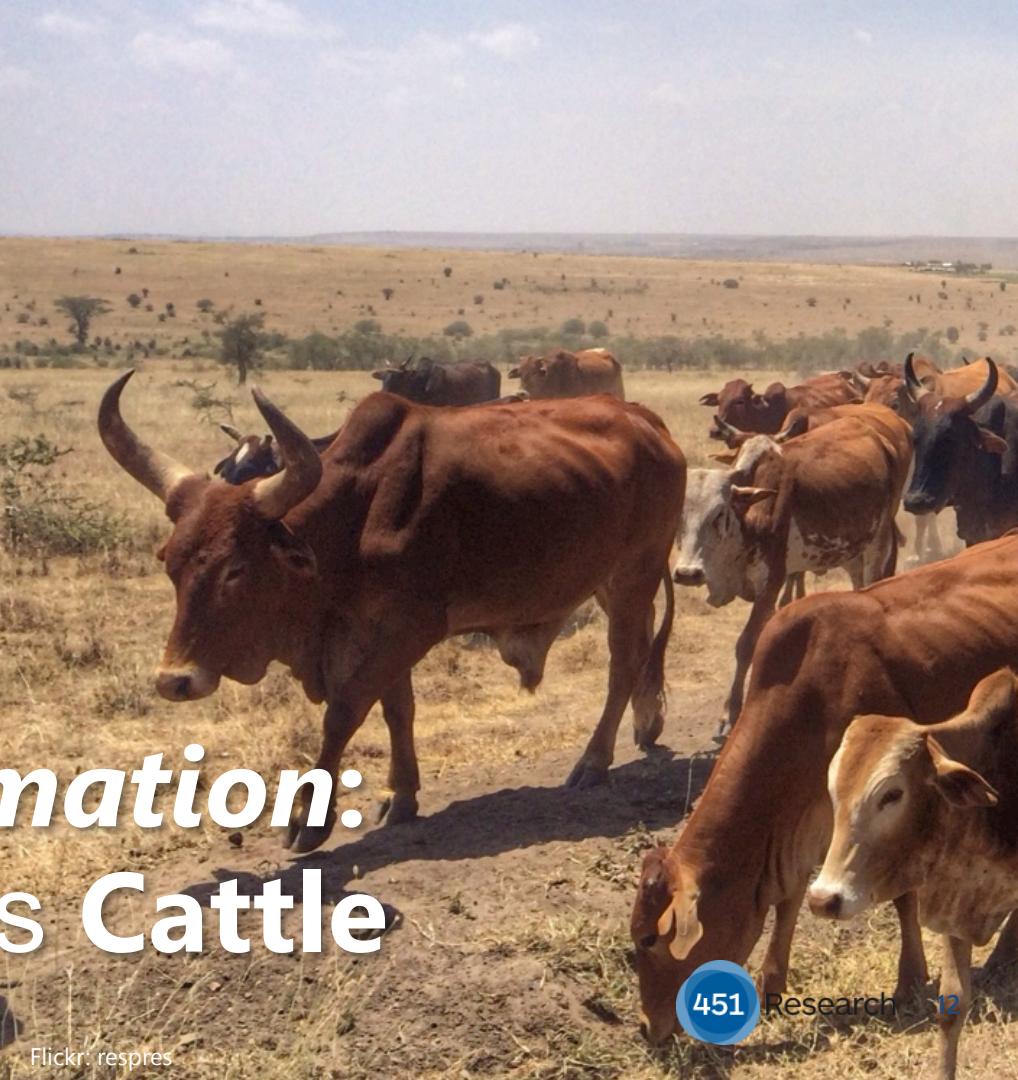
Automation

Measurement

A black and white photograph showing a person from behind, wearing a dark hoodie, hugging another person whose back is also to the camera. The person being hugged is holding a large, white, spiral-bound sign with the words "FREE HUGS" printed in bold, black, sans-serif capital letters.

FREE
HUGS

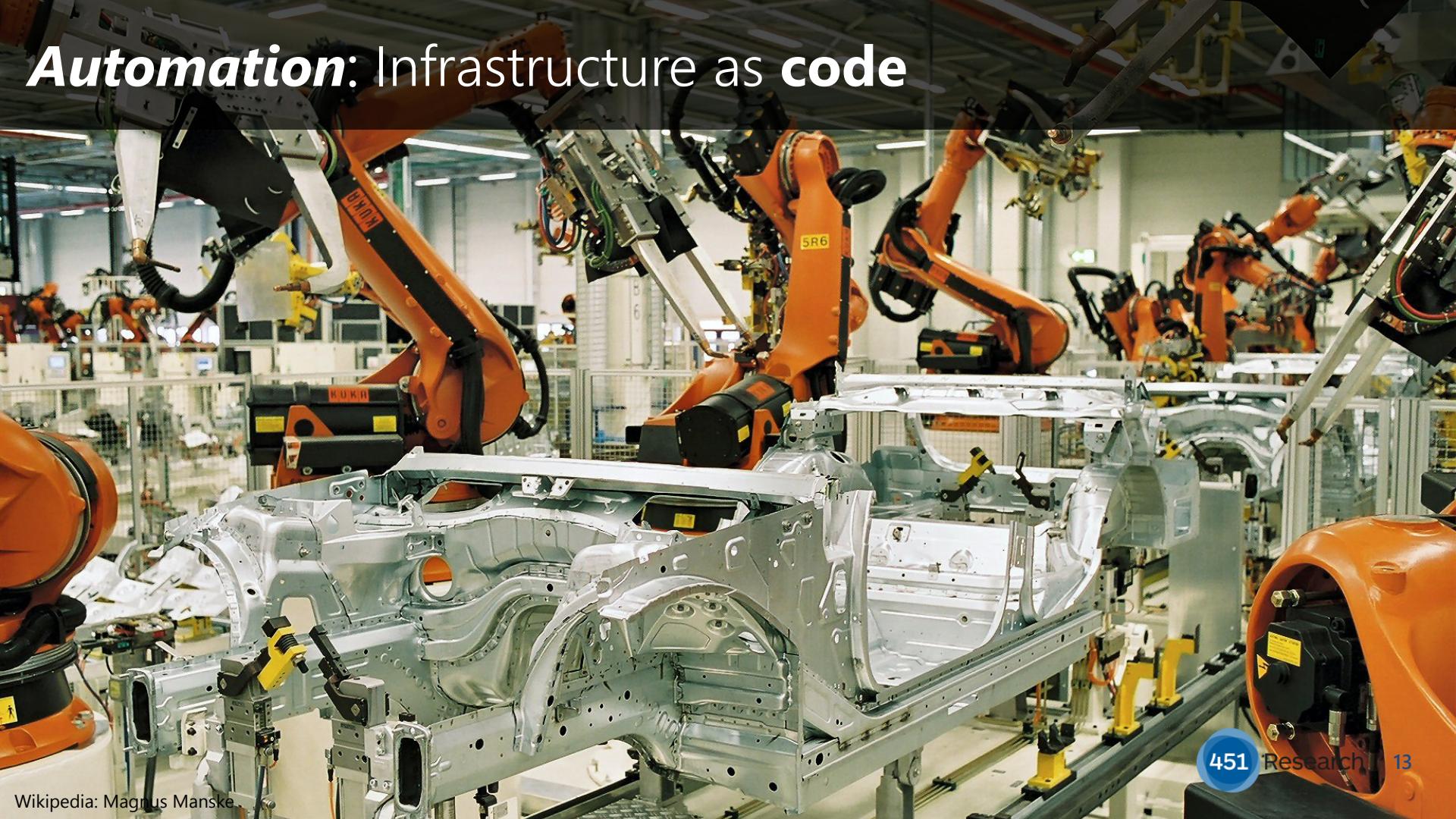
Culture:
Tear down all the silos



Automation: Pets vs Cattle

Flickr: respers

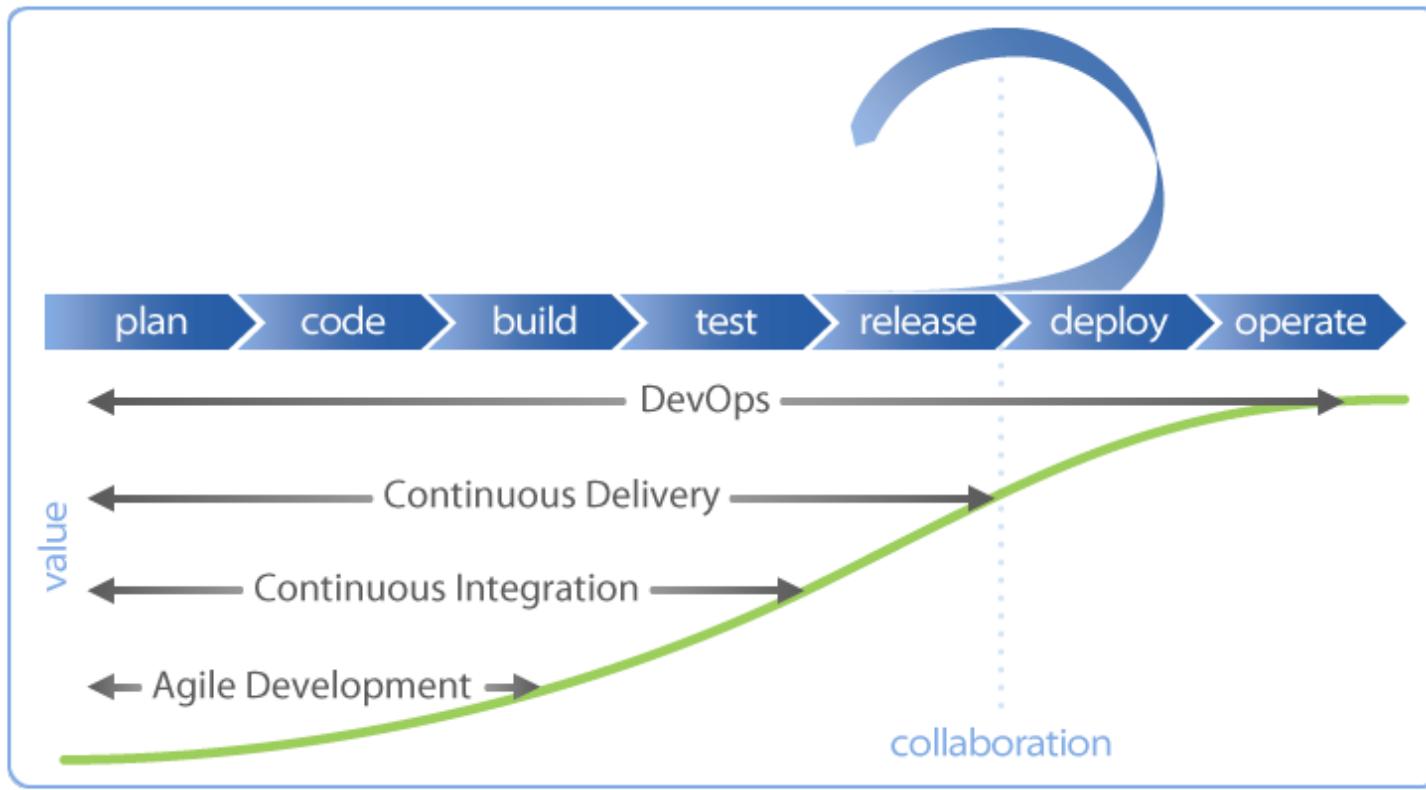
Automation: Infrastructure as code

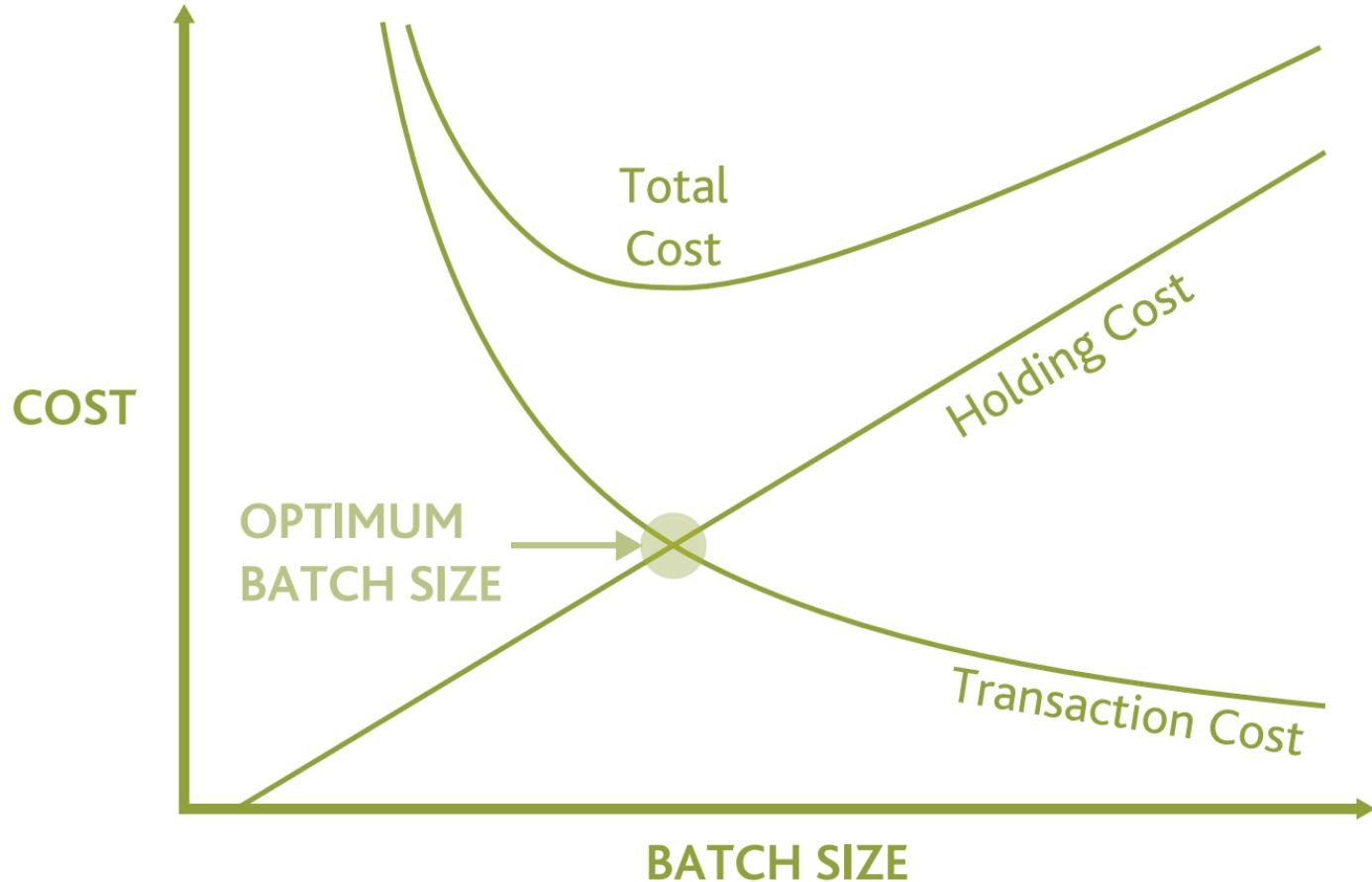


Knight Capital and the \$460 million bug

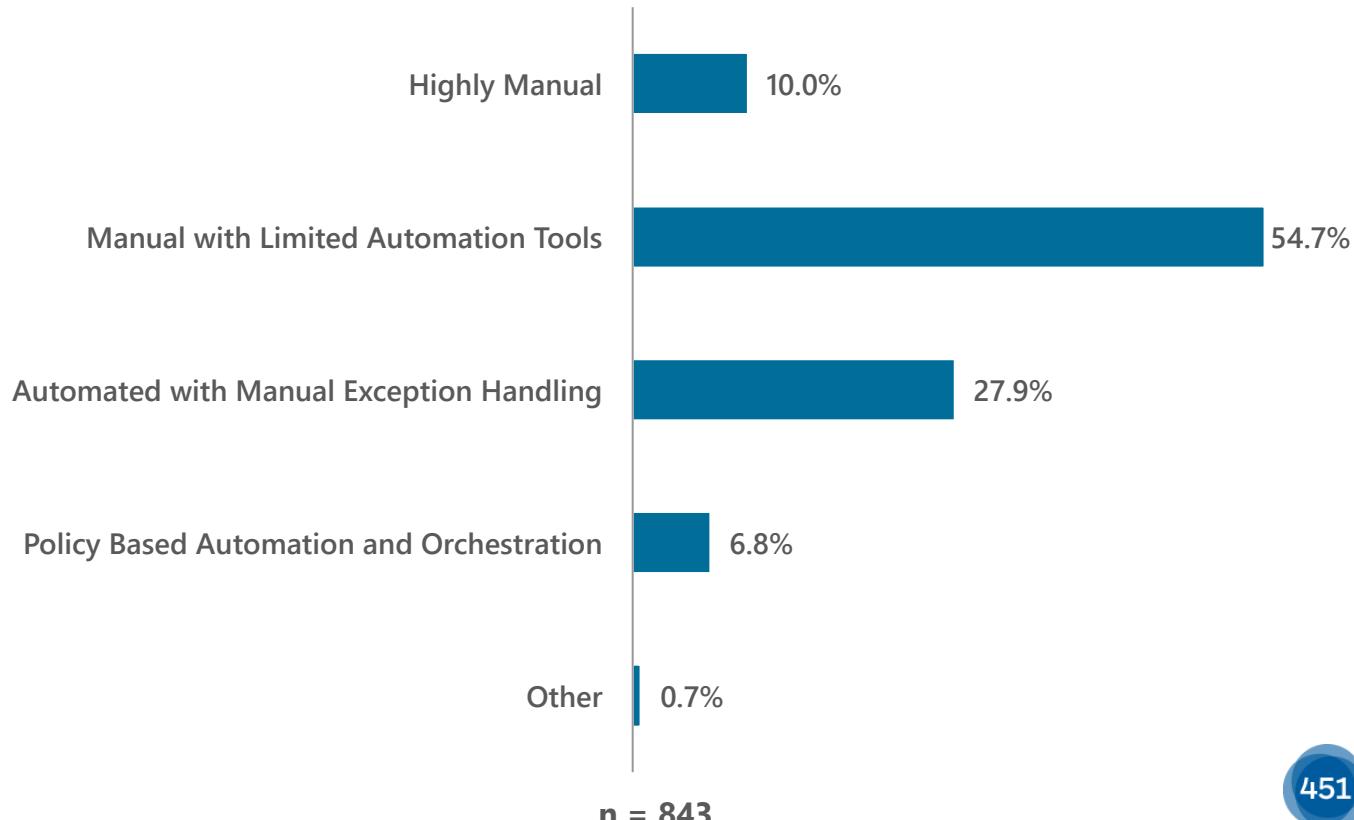


Continuous **delivery**



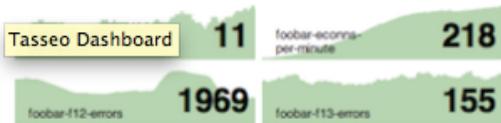


Where are we **today**?



Measurement: #monitoringsucks/monitoringlove

Nagios®
graphite



Kibana
Make sense of a mountain of logs Now in Ruby!

{ GRAYLOG2

splunk>

etsy / statsd

Who is **doing** DevOps?

Google, Amazon, Netflix, Etsy, Spotify, Twitter, Facebook ...

CSC, IBM, CA, SAP, HP, Microsoft, Red Hat ...

GE Capital, Nationwide, BNP Paribas, BNY Mellon,
World Bank, Paychex, Intuit ...

The Gap, Nordstrom, Macy's, Williams-Sonoma, Target ...

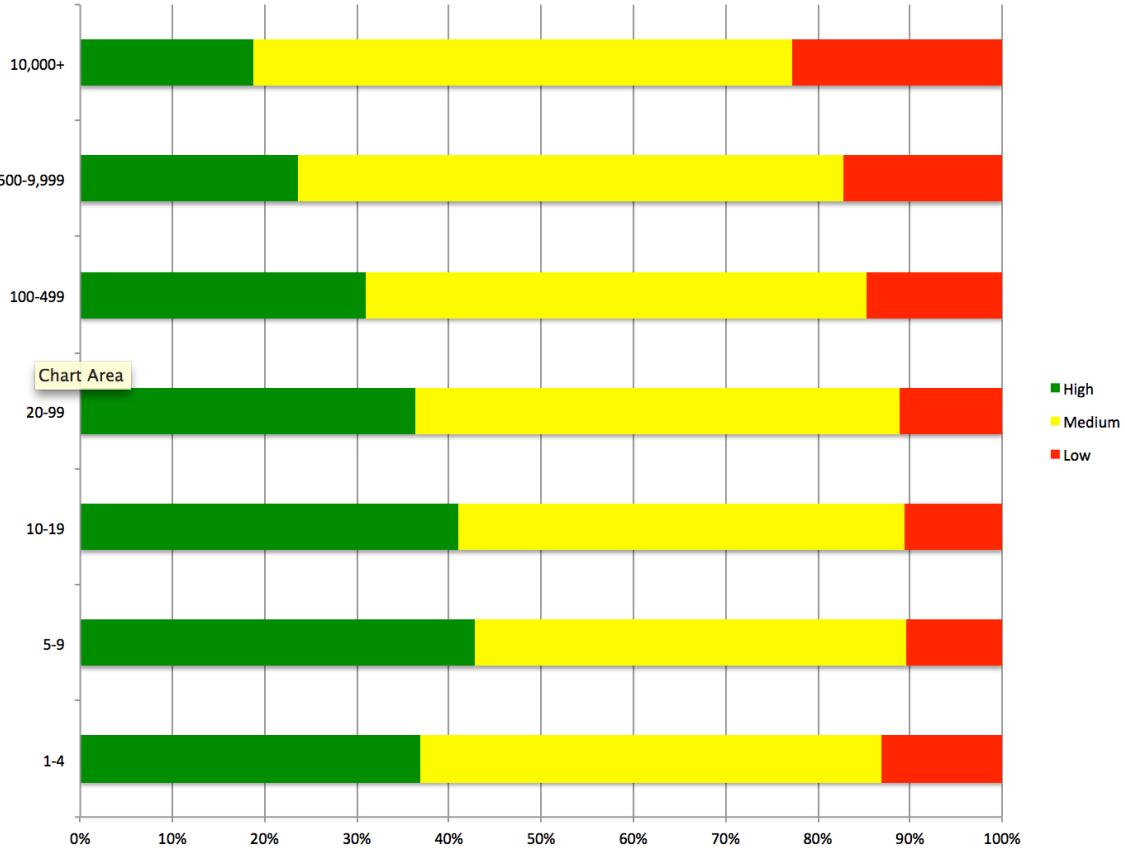
General Motors, Northrop Grumman, LEGO, Bosch ...

UK Government, US Department of Homeland Security ...

Kansas State University...

Who else?

Can Large Orgs Be High Performers?



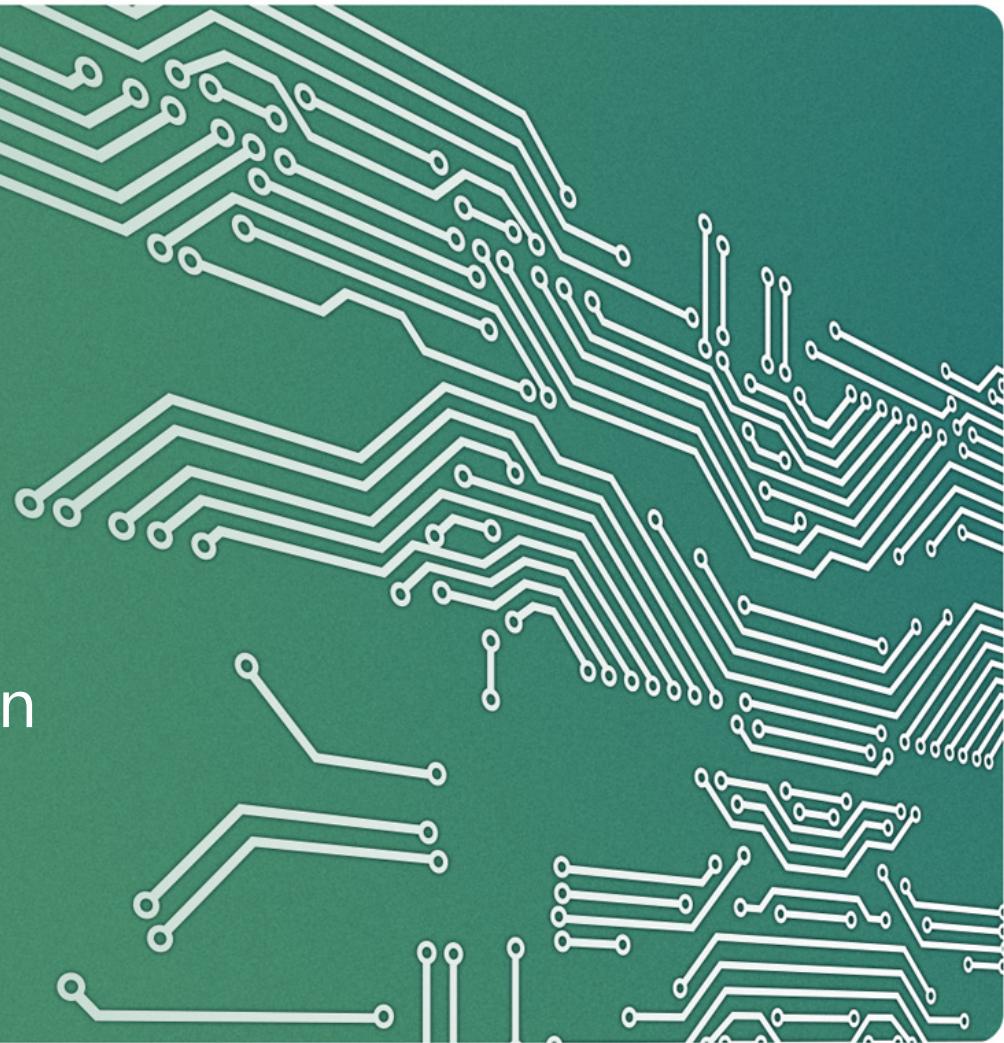
Yes.

But orgs with 10,000+ employees 40% less likely to be high performing vs. 500 employee orgs...

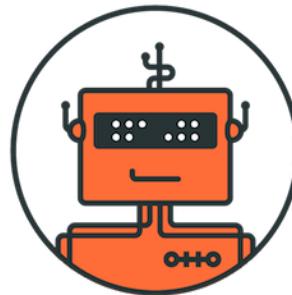
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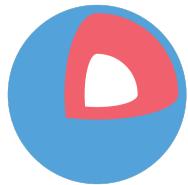
Enter **containers**:
The future of virtualization



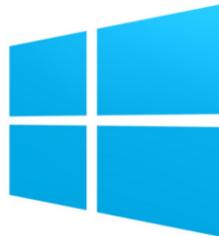
Automation, agility, empathy



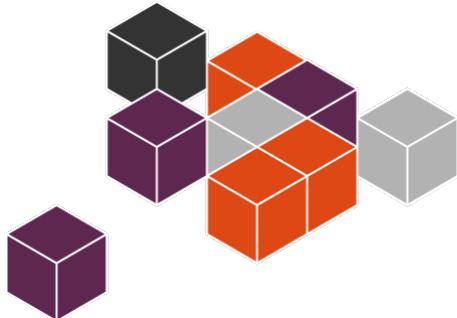
Container-native OSs



Core OS



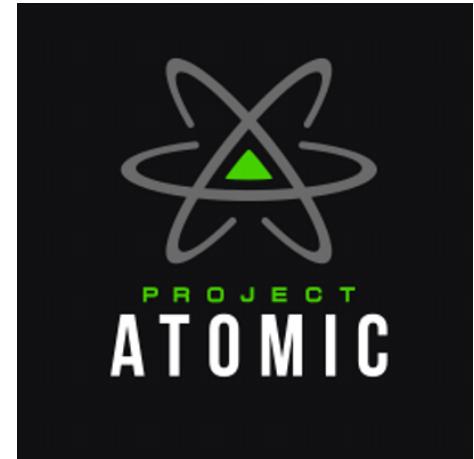
Nano Server



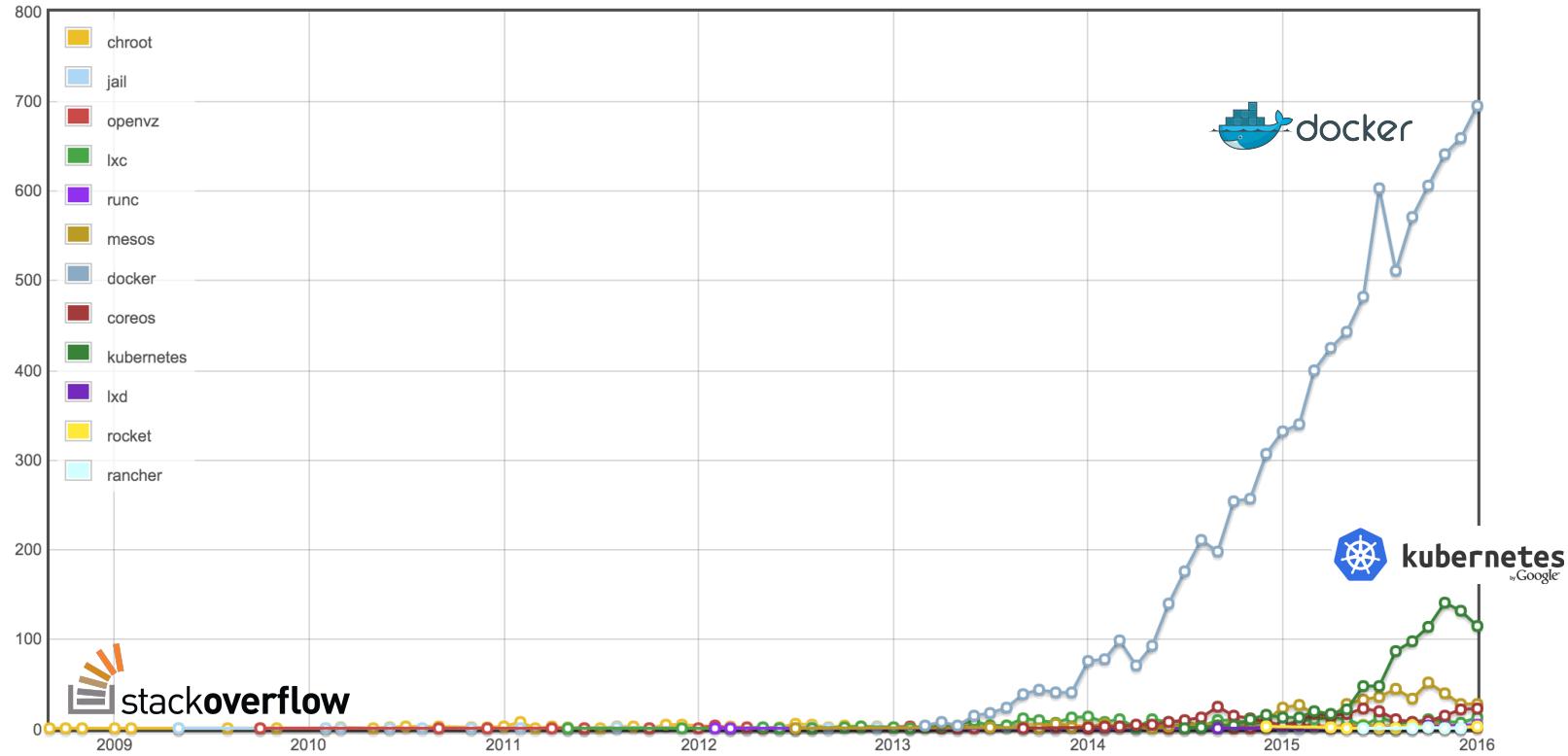
Snappy Ubuntu



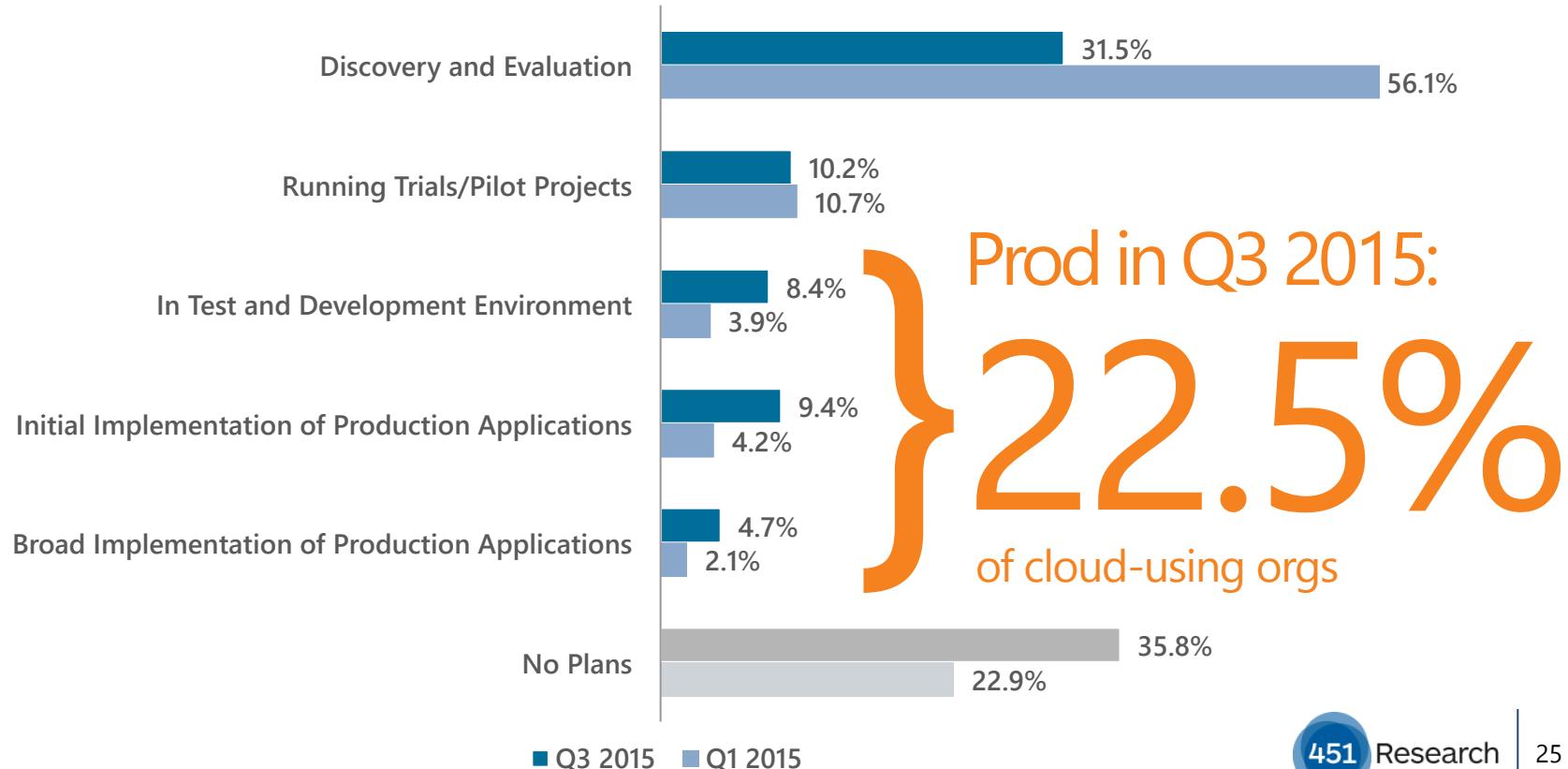
PHOTON™



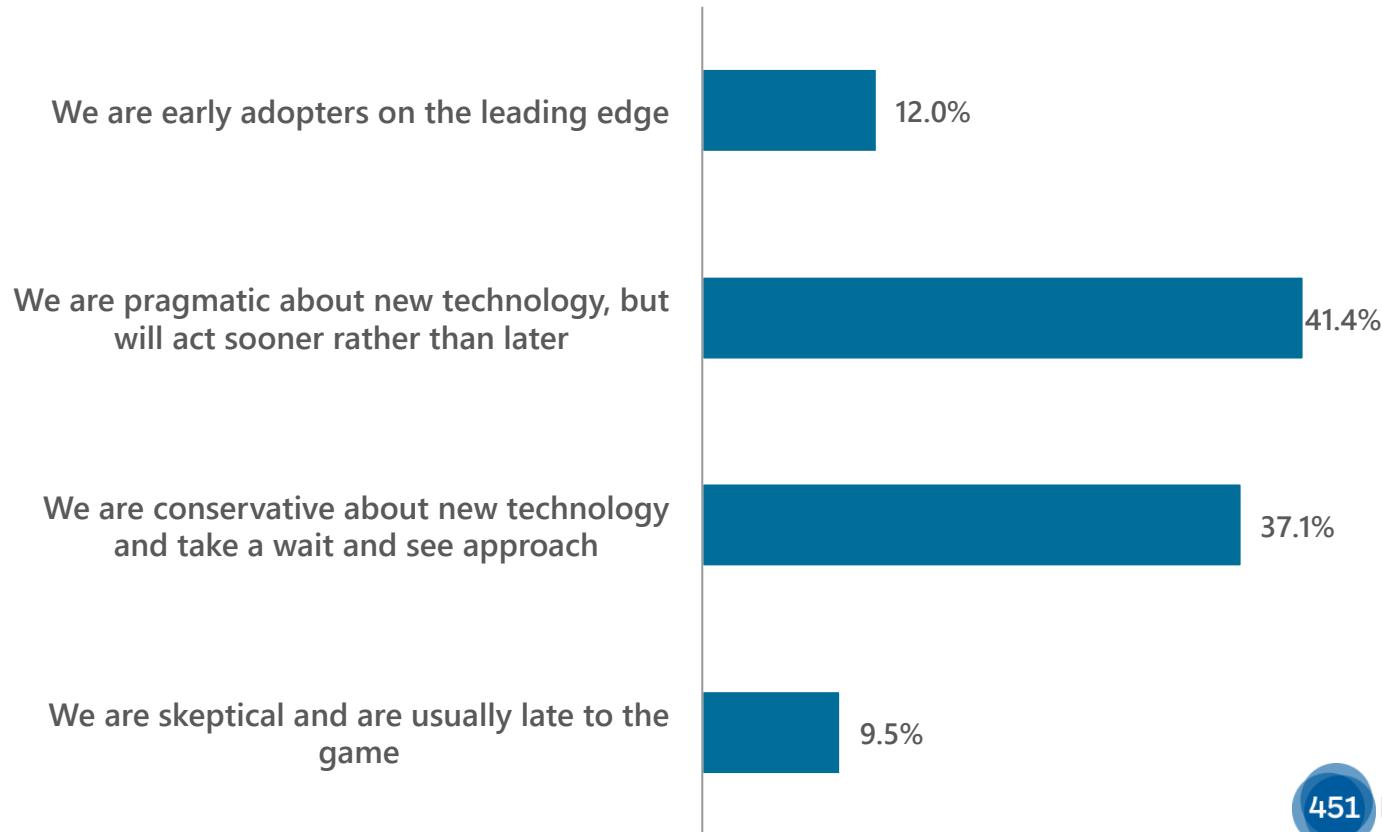
Developers love Docker



Docker is **not** just a toy



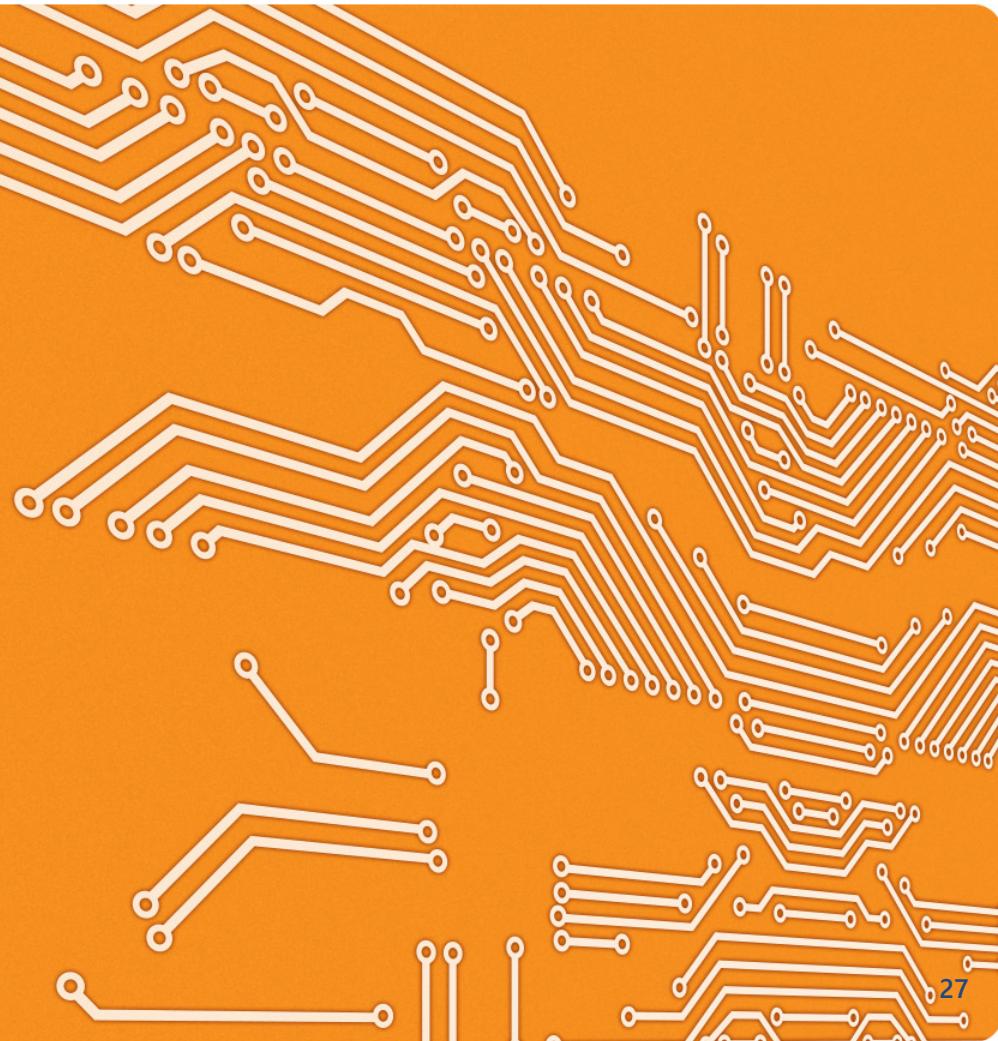
Today, early adopters. Tomorrow, the **majority**.



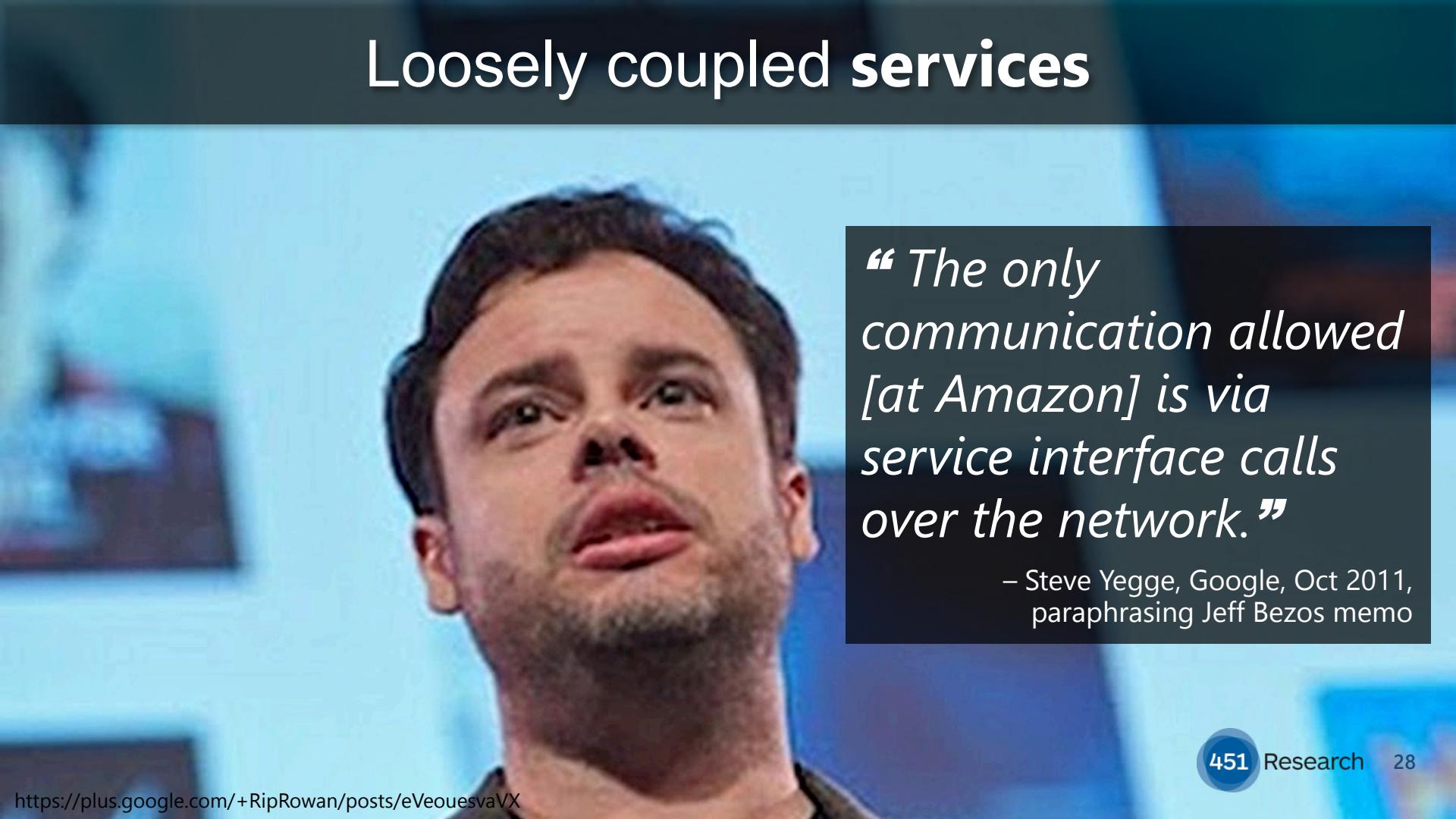
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Fragmentation
drives **microservices** —
enabled by containers



Loosely coupled services

A close-up photograph of Steve Yegge, a man with dark hair and a beard, looking upwards and slightly to his right with a thoughtful expression.

“The only communication allowed [at Amazon] is via service interface calls over the network.”

– Steve Yegge, Google, Oct 2011,
paraphrasing Jeff Bezos memo

Loosely coupled **teams**

“One of the biggest changes is that we no longer have an official ‘architecture’ team. Instead, we have made ‘architecture’ an ‘ingredient’ on each of our teams.”

– Lauri Apple, Gilt Groupe, 14 Nov 2014

The **foundation** of microservices



kubernetes
by Google



Capgemini / Apollo

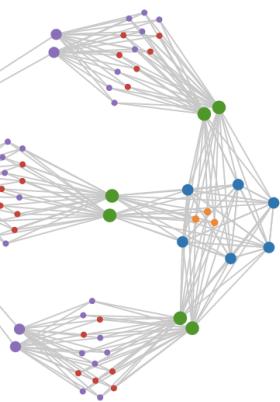
Amazon EC2 Container Service

Monitoring remains a challenge

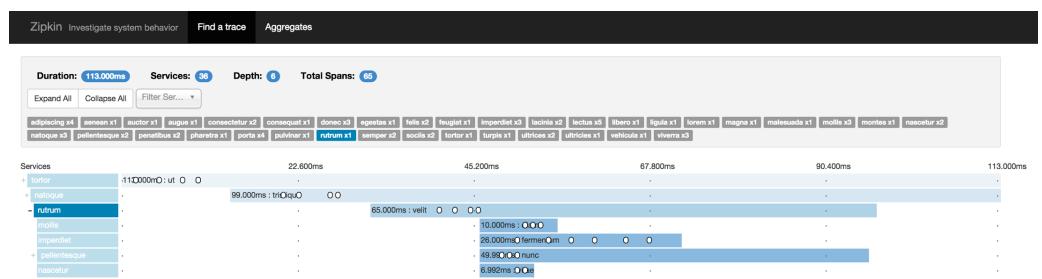
- Scale
- Complexity & flow
- Transience
- Bottlenecks / queue depth
- How to respond to self-healing issues?

Open-source tools emerging (proprietary too)

spigo / simianviz



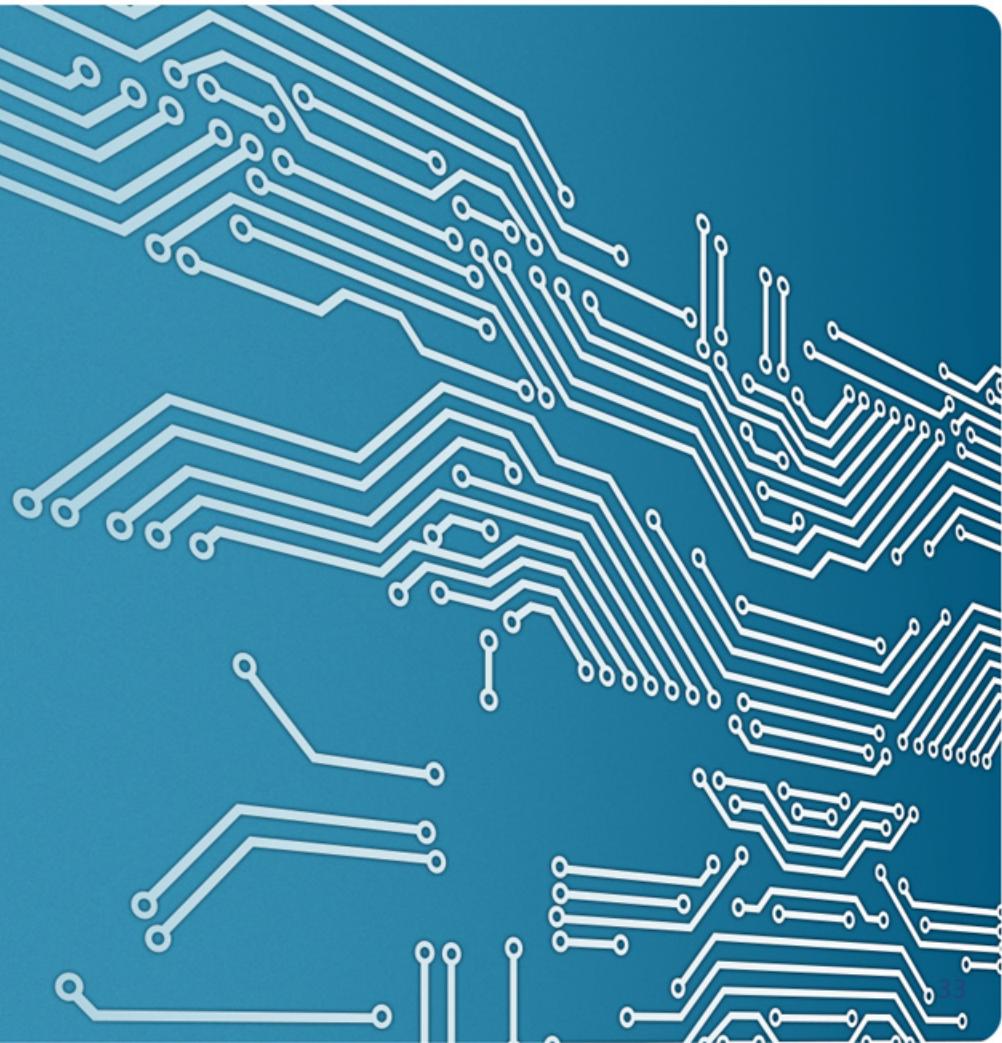
Zipkin



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Real-world **examples**

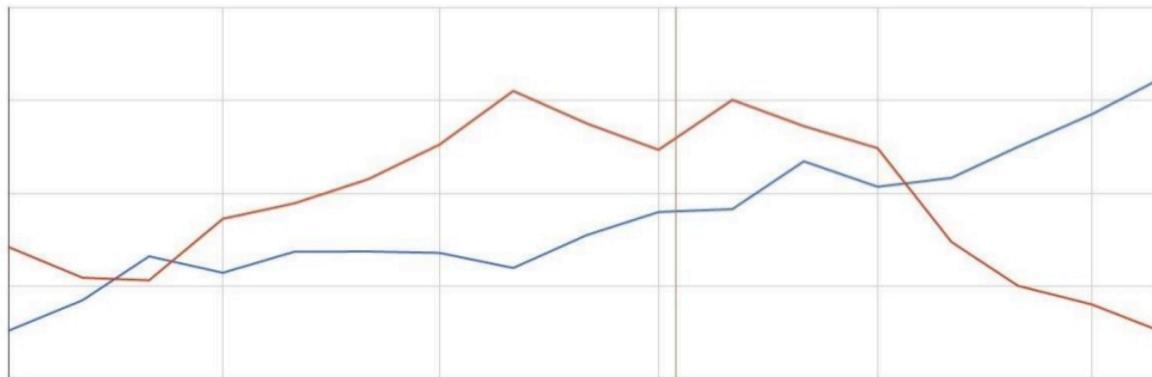


Real-world example #1

Infrastructure operating cost – a very important KPI

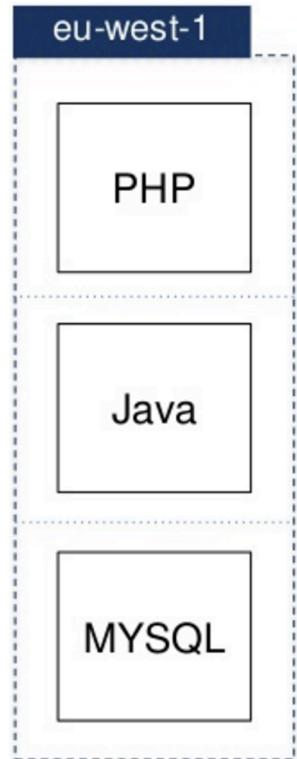


■ global total jobs completed ■ Monthly AWS cost/job

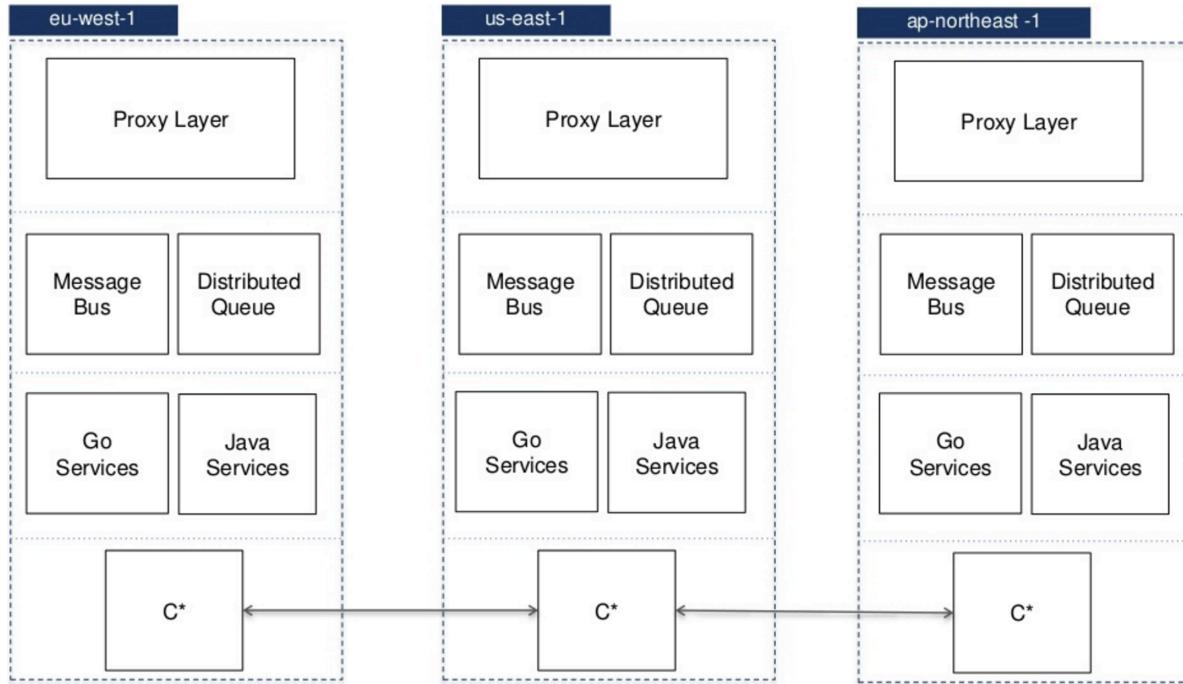


AWS User Group UK 2014

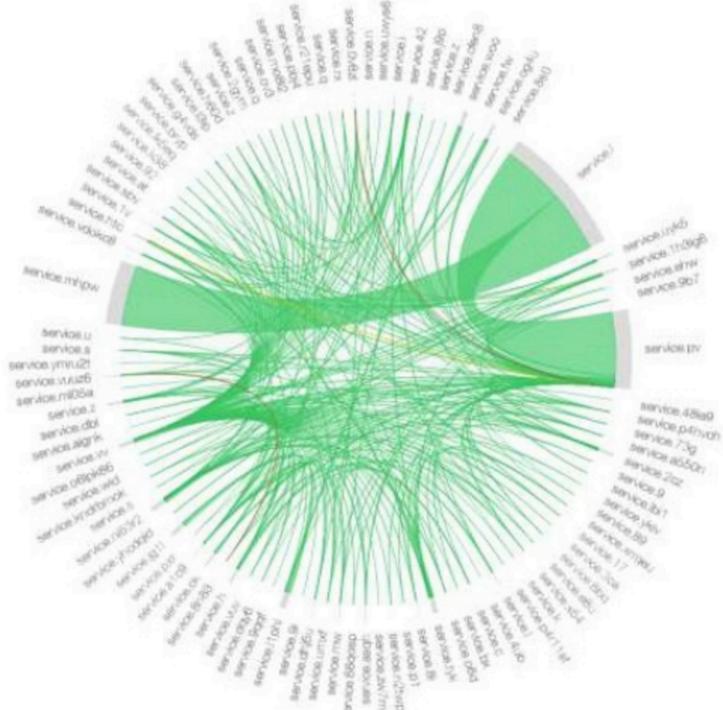
Hailo architecture



Hailo architecture



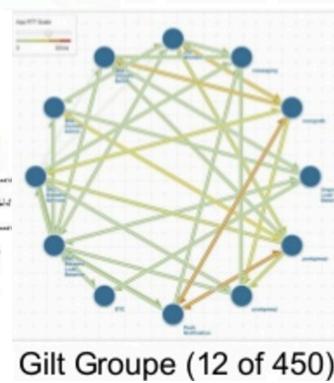
Hailo architecture



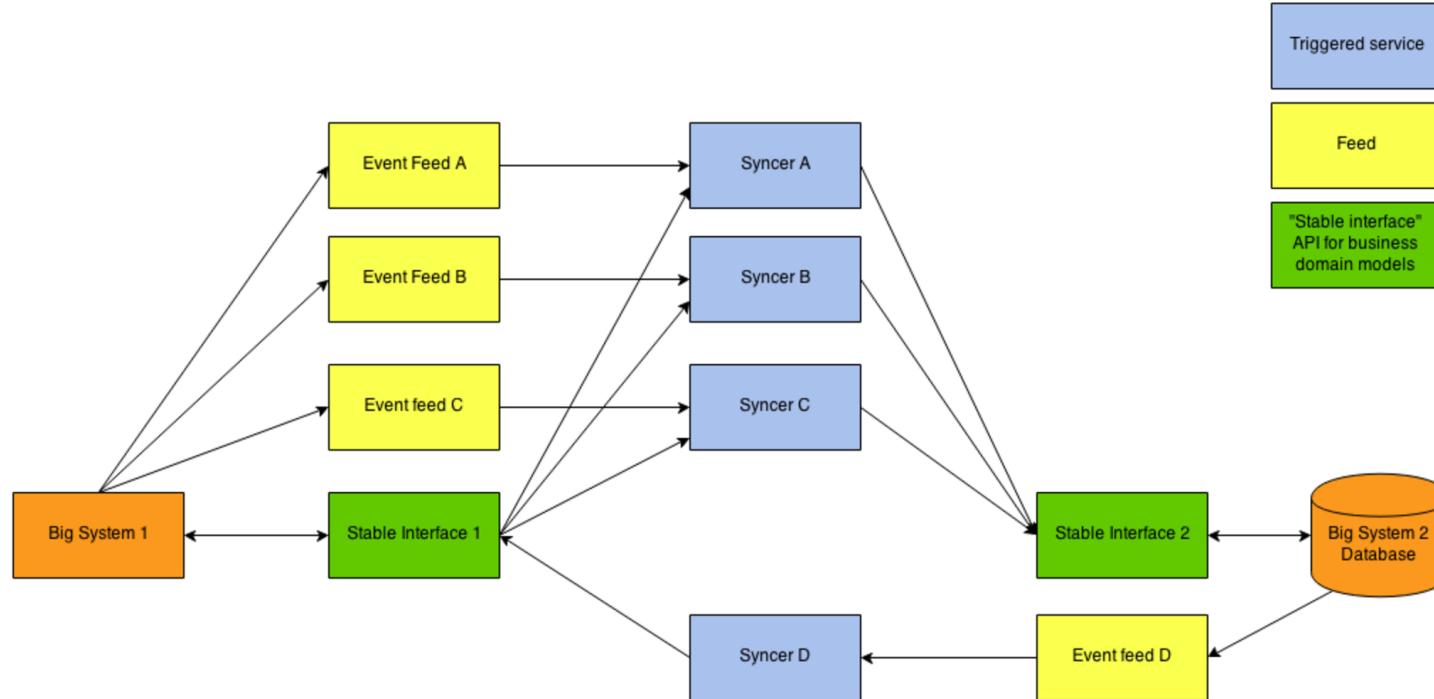
*“Our infrastructure is decomposed into a large number of very simple pieces of software – each of which is independently deployed and **monitored**, and can be easily reasoned about.”*

– Matt Heath, Hailo, 9 Mar 2015

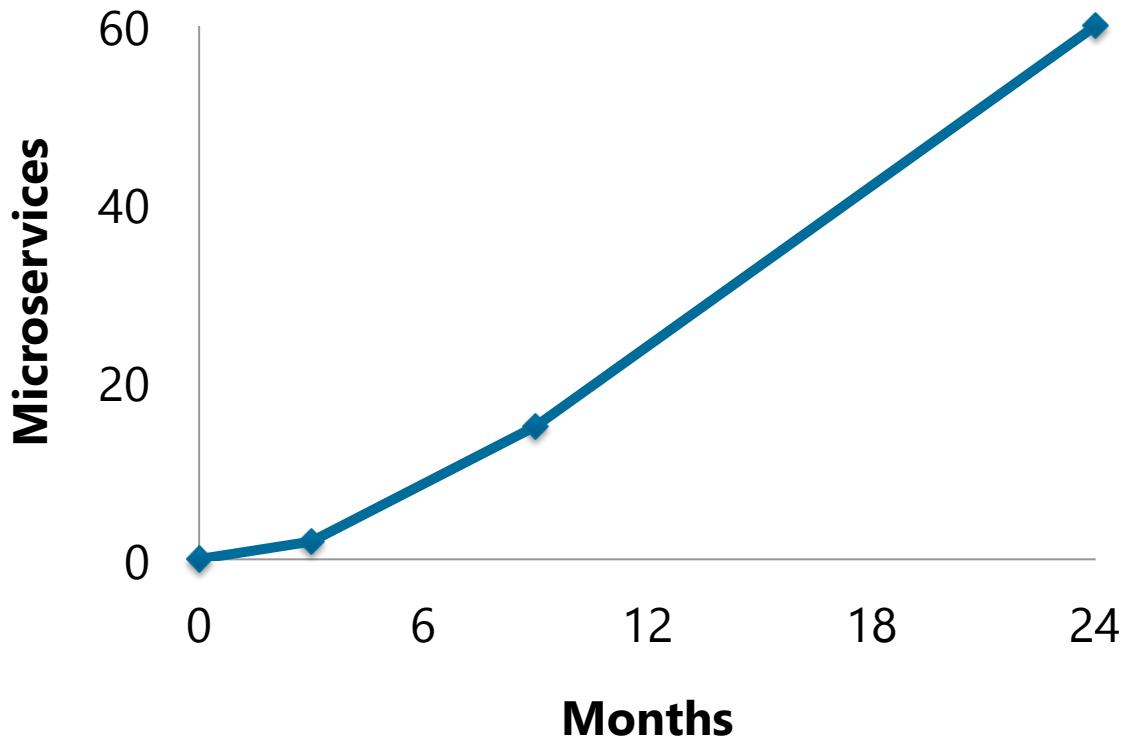
Complexity is the new normal



Real-world example #2: REA (realestate.com.au)



REA microservices timeline



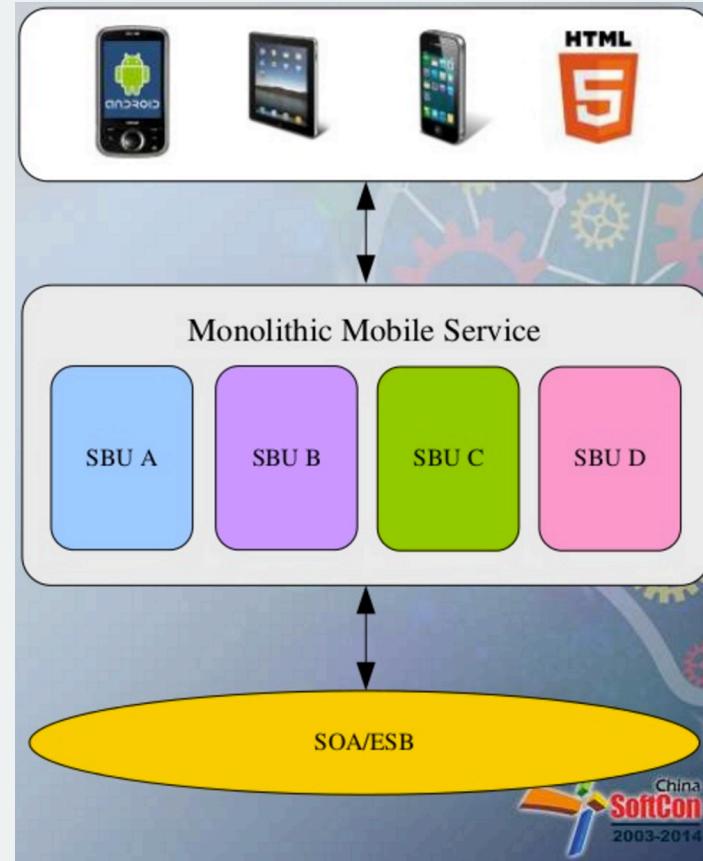
“ Microservices is a long term strategy.”

– Evan Bottcher,
ThoughtWorks/REA,
9 Dec 2014

*“We relied on [our open-source library] Pacts, some manual tests, and then made sure there was very good **monitoring** in production.”*

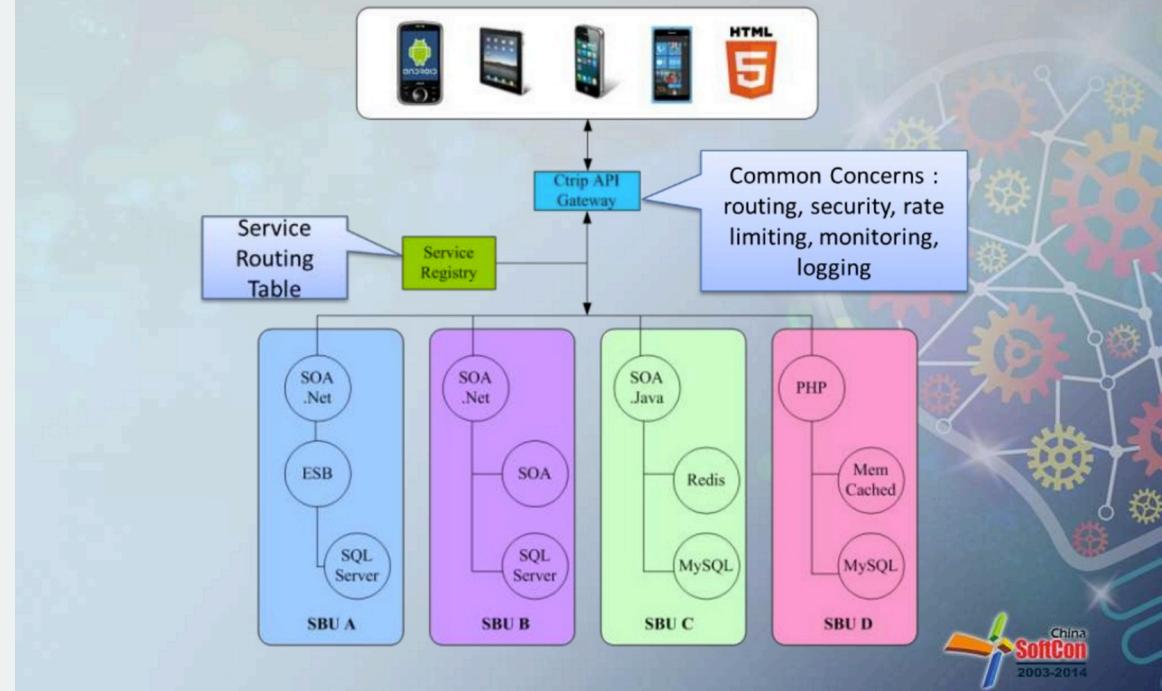
– Beth Skurrie, REA consultant, 10 Nov 2014

Real-world example #3: Ctrip (Chinese travel site)



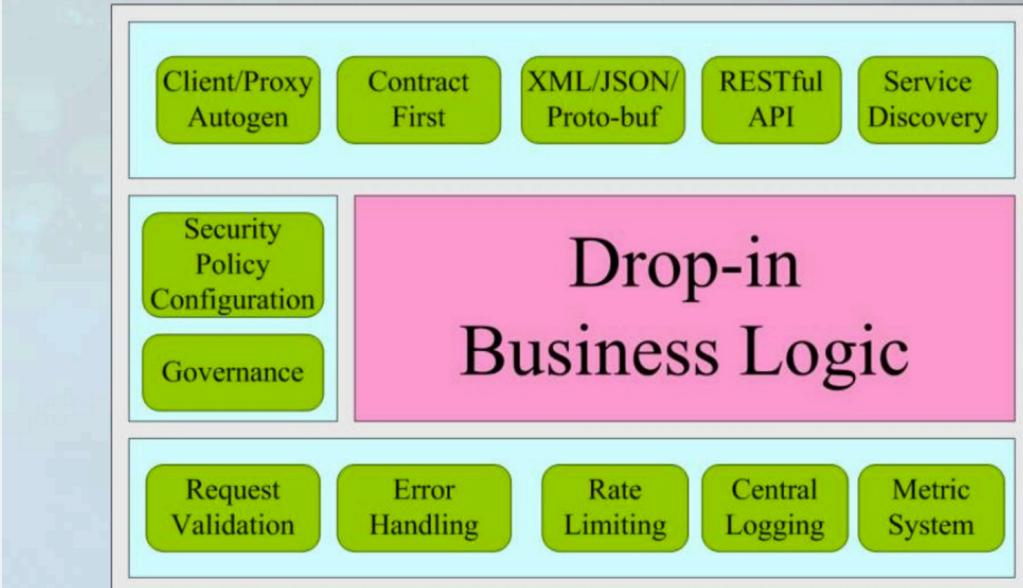
Real-world example #3:
Ctrip (Chinese travel site)

New Mobile Backend Arch @Ctrip



Real-world example #3:
Ctrip (Chinese travel site)

MicroService Framework @Ctrip



Real-world example #3:
Ctrip (Chinese travel site)

Key MicroService Infrastructure

- Service
 - Service framework, gateway, registry
- Monitoring
 - Logging, tracing, metrics
- Deployment
 - TEST/UAT/PROD environments
 - CI/CD
- Push common concerns to technical infrastructure



Minimizing **risk**, maximizing **agility**

Architecture: Microservices, composable monitoring

Code: Continuous integration, feature flags

Servers: Continuous delivery, infrastructure as code

Services: Rolling updates, resilience engineering

Product: Continuous deployment, restricted audience

How? DevOps (Culture, Automation, Measurement)

What? Microservices

Why? Survival

Thank you!

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