LinkedIn SRE:
From Inception to Global Scale



Bruno Connelly & Viji Nair

About Us



Bruno Connelly

VP, Engineering

Joined LinkedIn in April 2010

Background in ISP and Consumer Internet

Initial experience team building in Asia in 2005

About Us



Viji Nair

Director, SRE

Joined LinkedIn in January 2012

16 Years as an SRE + Startups

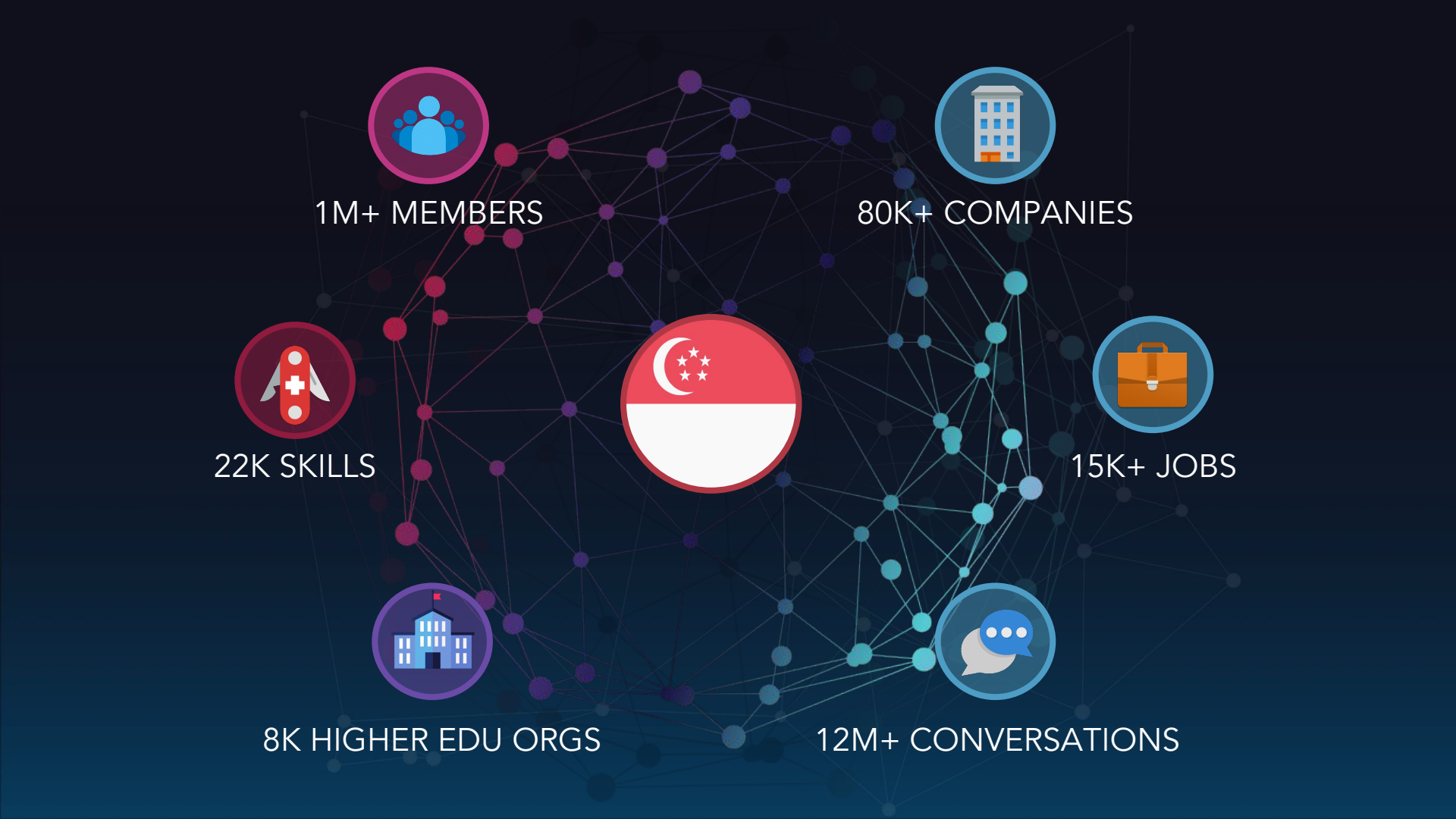
Open source evangelist and contributor

Working with global teams since 2006

OUR VISION

Create economic opportunity for every member of the global workforce


MEMBERS
COMPANIES
SKILLS
ECONOMIC GRAPH
JOBS
SCHOOLS
KNOWLEDGE


1M+ MEMBERS
80K+ COMPANIES
22K SKILLS
15K+ JOBS
8K HIGHER EDU ORGS
12M+ CONVERSATIONS

Growing Global Network



500M+

Members



100K

Articles published weekly



100M+

Monthly Unique Visitors



2

New sign-ups per second



50%

Active members use Linkedin Messaging weekly



40%

yr/yr increase in engaged feed sessions weekly

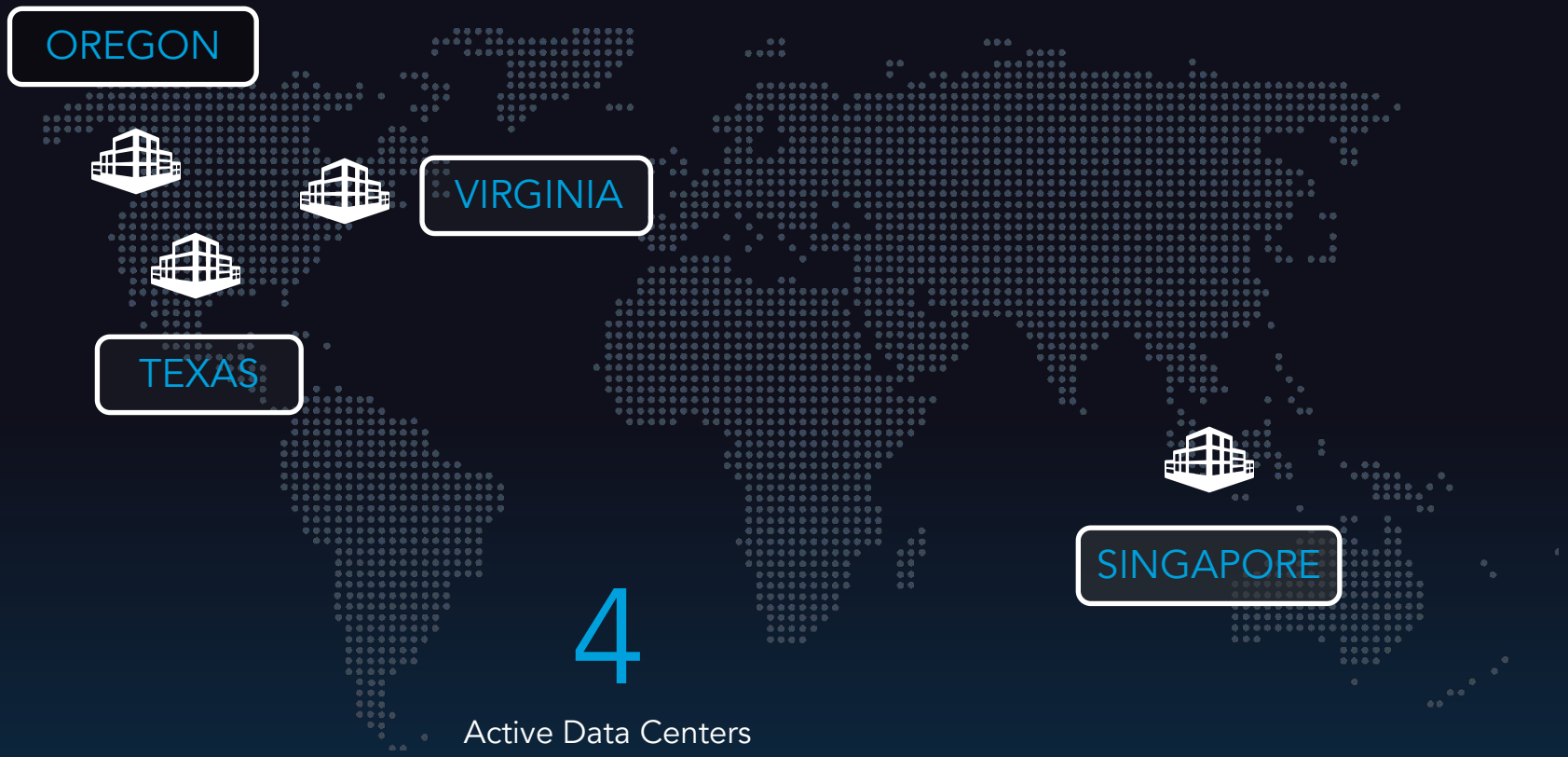
Numbers Behind the Scenes

340K Edge QPS	1.5K Services in production	770K Graph QPS	60B Graph Edges
600TB Data storage	12M Peak Data QPS	2T Kafka Messages published/day	4T Kafka Messages consumed/day

Edge POP Footprint



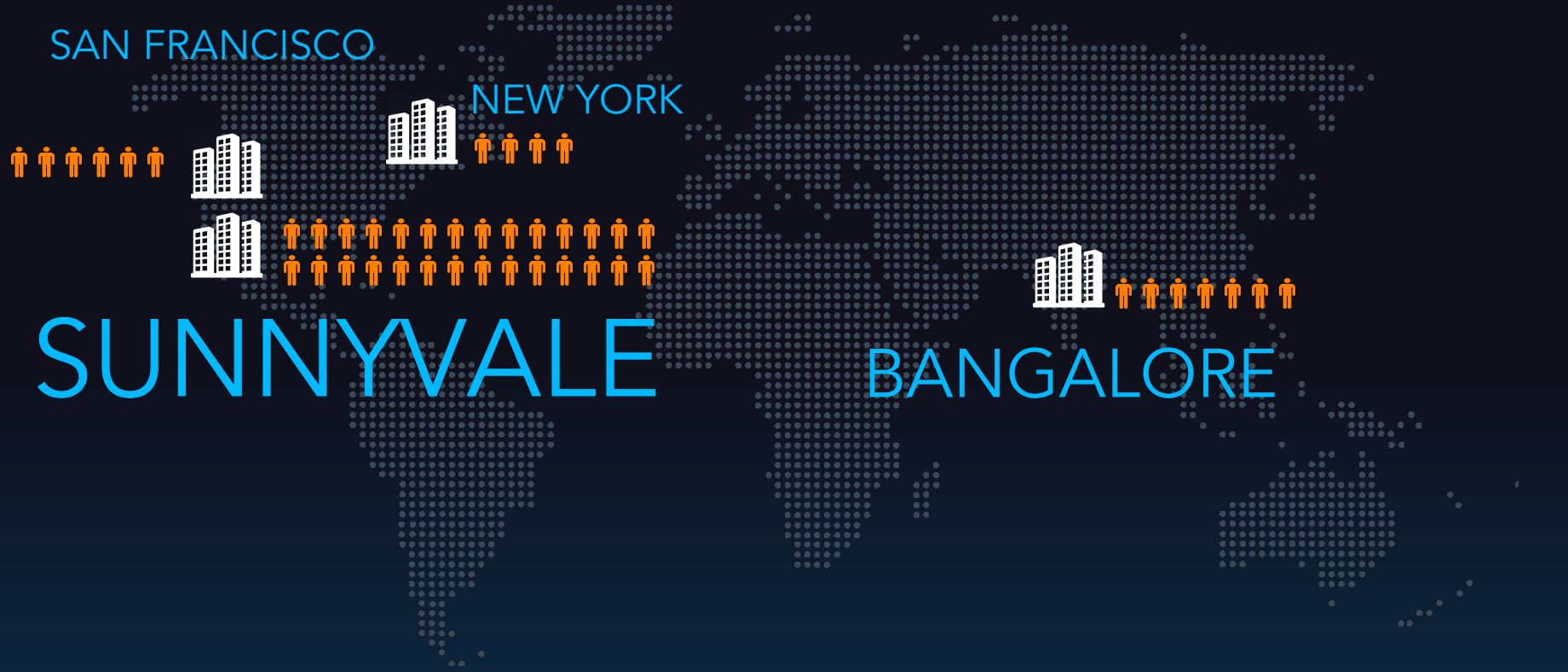
Production Application Footprint



4

Active Data Centers

Engineering Footprint



Looking back… 2010

Entire Production Footprint

2010



2
Data Centers

1
Active Data Center

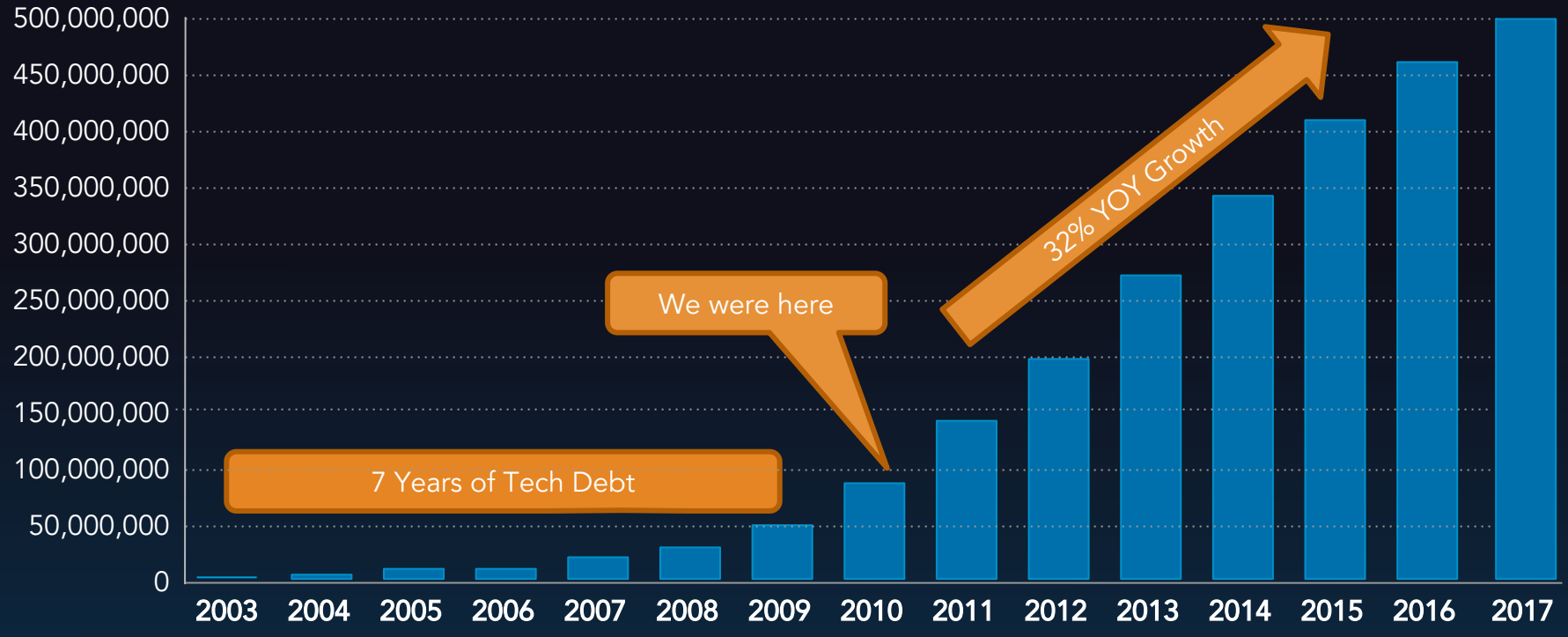
LinkedIn Operations

2010



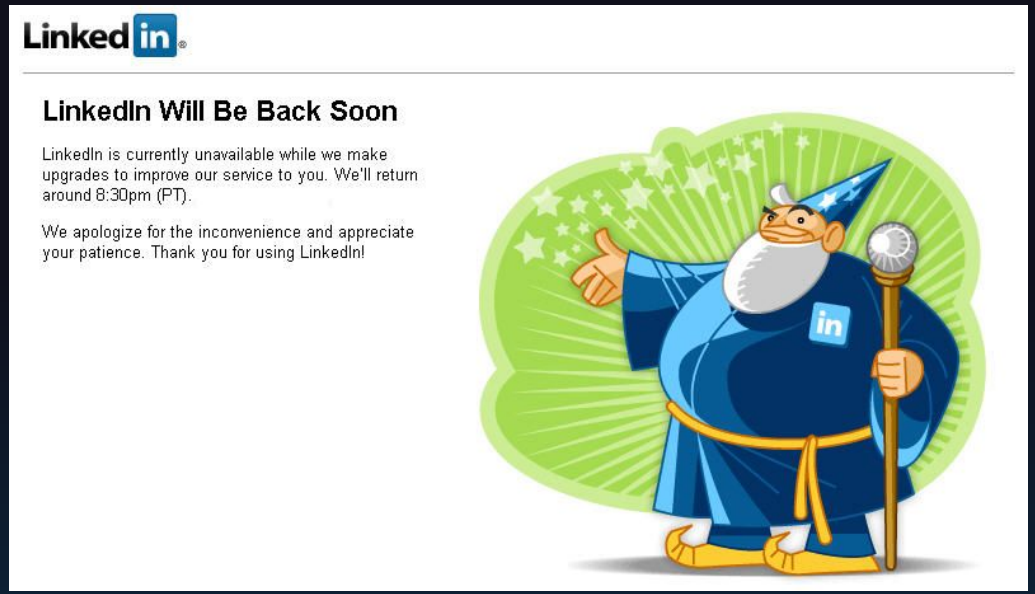
- Classical, stratified model: Systems, Networks, Applications, DBA
- Heavy-weight processes driven by tickets and heroes
- Culture of not trusting developers in any deployed environments
- Huge wall and growing frustration between Dev and Ops teams (and in ops itself)
- 7 engineers in total made up NOC, SRE, Release Operations: “Site Operations”
- On-call was horrible

Member Growth



Is the Site Up?

2010



- Peak traffic periods Mon-Wed ~ 6-10am
- Regular capacity related outages Mon-Wed ~ 6-10am
- Zero tolerance for failure in the application stack
- Near zero instrumentation
- Bi-weekly downtime maintenances

self service everything

auto remediation

more data centers

graceful degradation

remove monolithic databases

remove hardware load balancers

automated datacenter buildout

auto escalation

24/7 deployments

move to service oriented architecture

Let's make a few changes

move faster

change software development model

active/active serving model

code contributions to the main application stack

3x3 deployments

cheaper datacenters

replace java serialized objects over RPC with REST APIs

dev driven deployments

modernize our application stack

Core Principles



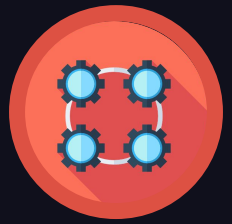
1

Site Up



2

Empower Developer Ownership



3

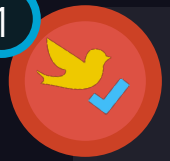
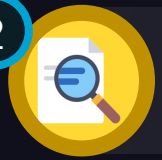
Operations is an Engineering Problem

Everyone should be able to deploy code

[safely]



Self-service Deployments

1.  "Canary" to a single production instance
2.  EKG: automated metrics-based validation
3.  Promote to a single production data center
4.  Promote to remaining production data centers
5.  Ramp features slowly to the member base

15K+
Successful commits/day

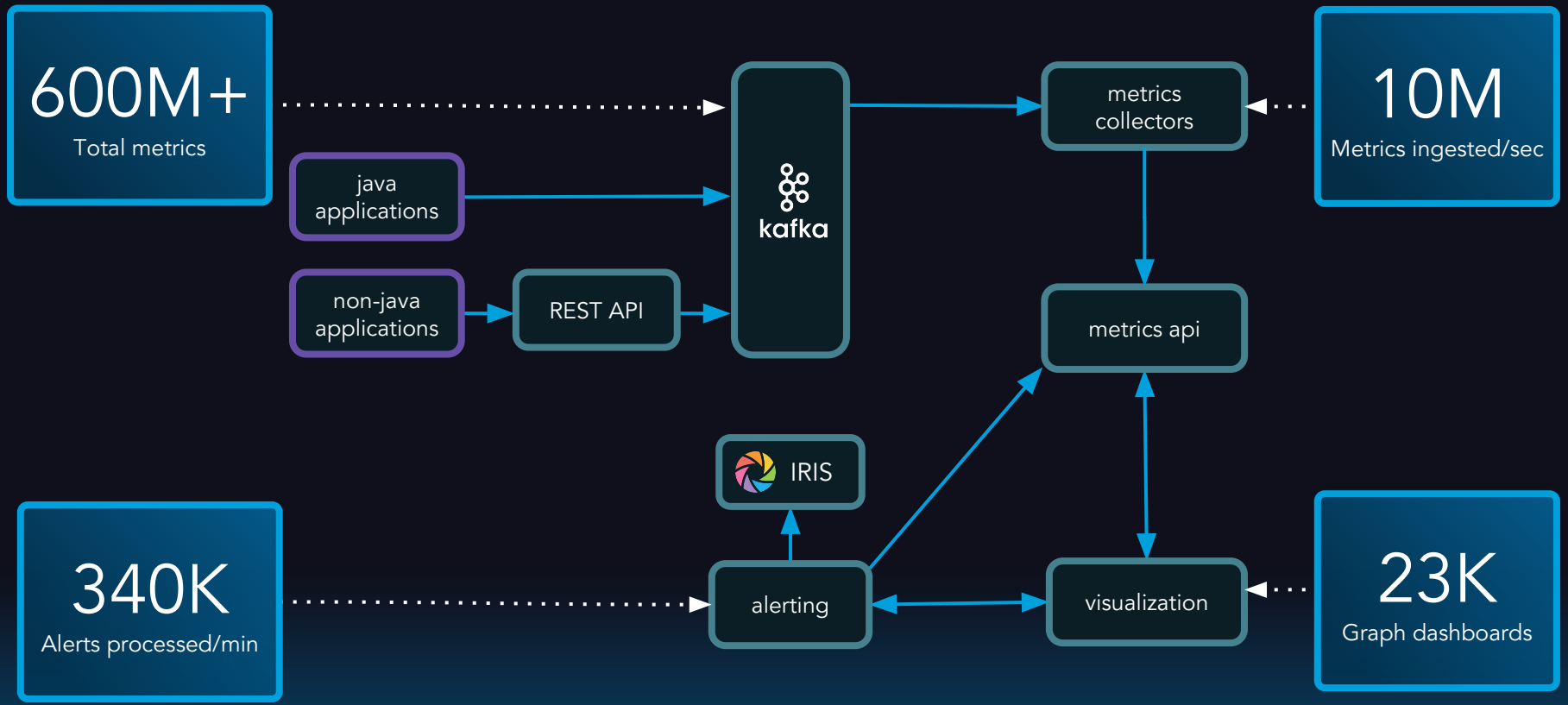
200+
Code promotions/day

600+
Feature ramps/day

Create a culture of operational metrics

"What gets measured gets fixed."

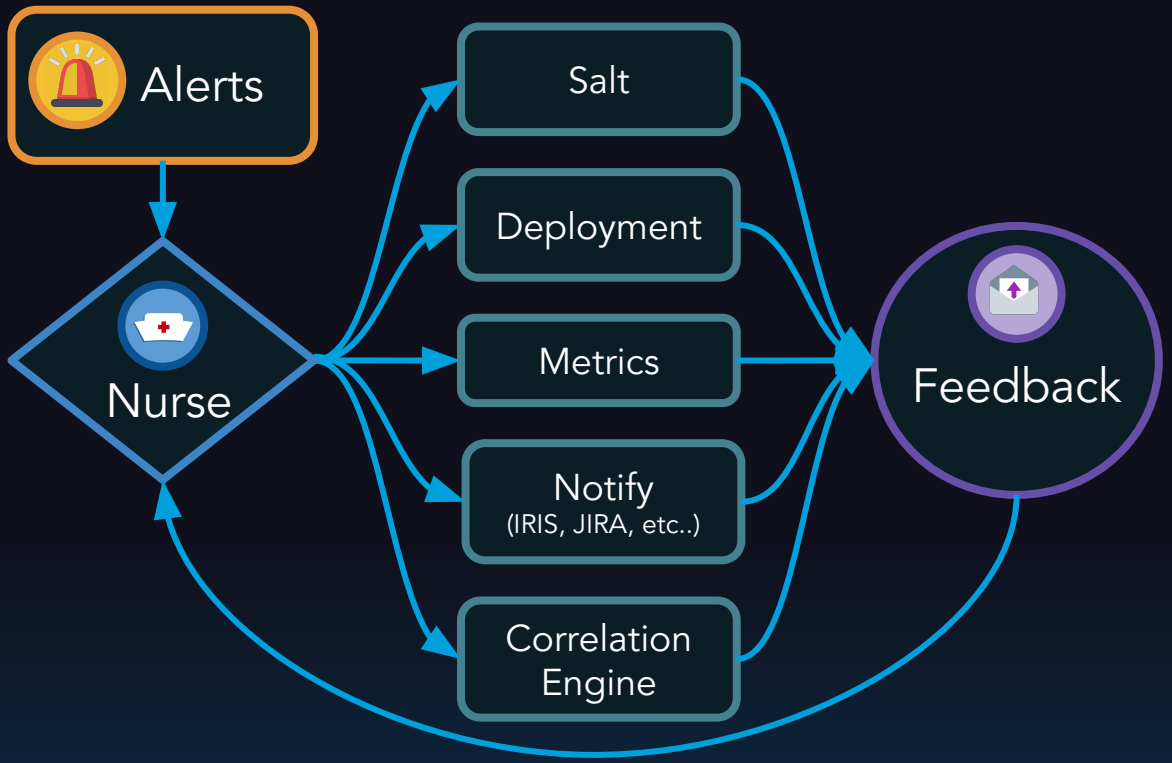
Self-service Instrumentation and Monitoring



We don’t want a traditional NOC

[permanently]

Self-service Remediation and Escalation

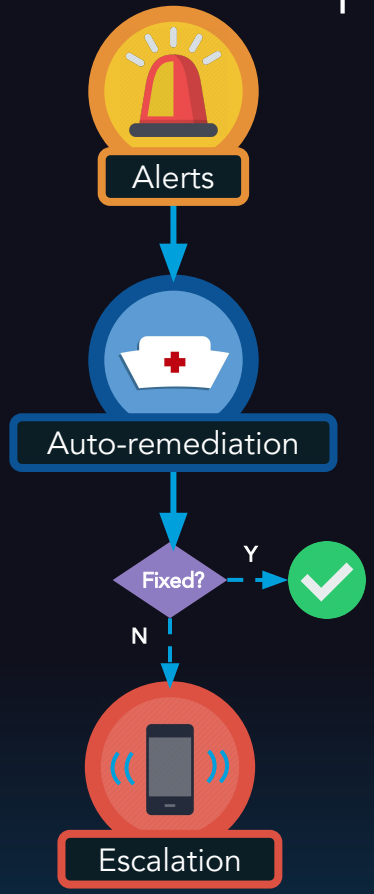


15K
Remediation Plans

9K
Escalation Plans

17K
Executions/day

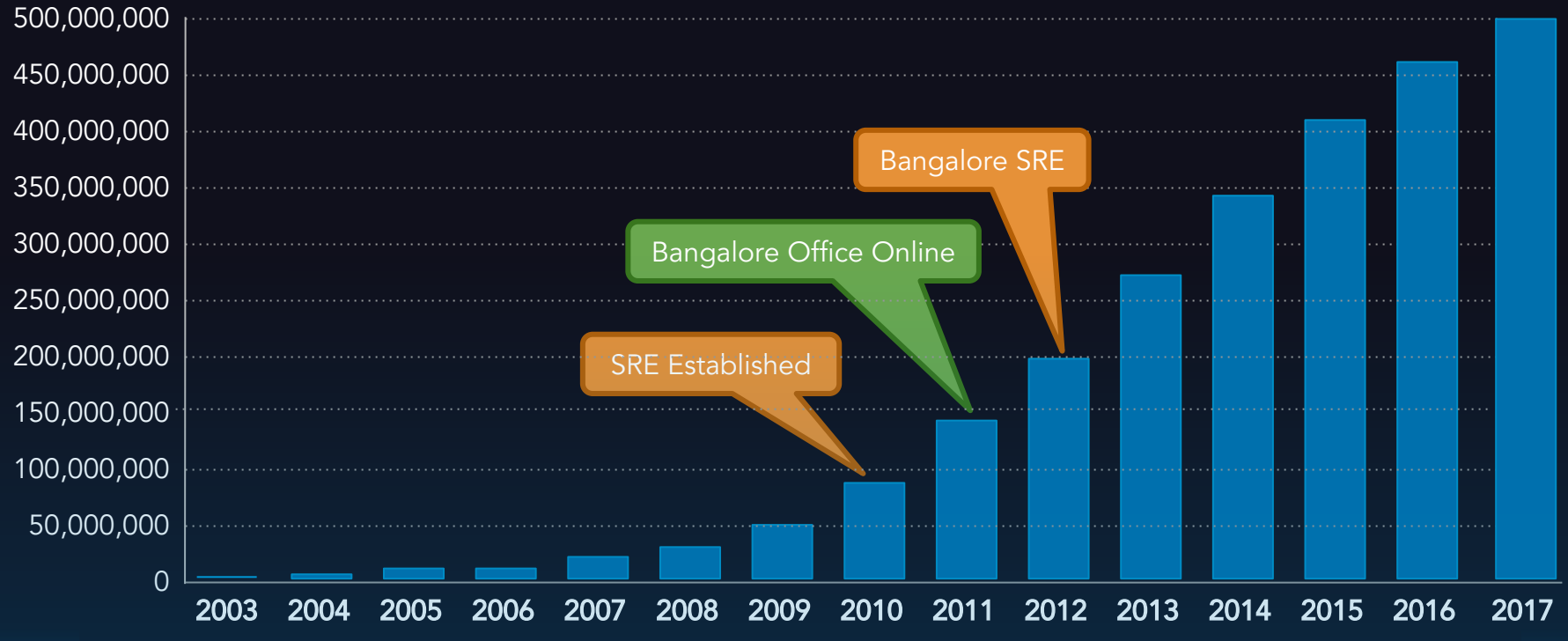
Unexpected outcomes from a different model



- Tiered escalation systems did not scale and incentivized undesirable outcomes
- Introduced “Production SRE”; SREs solving NOC problems via software
- Created NOC to SRE transition program

Scaling the team into India

Member Growth



Ground Rules



1

Follow the sun is not the goal



2

Start simple



3

Same culture, same hiring bar, same everything



We made mistakes and learned from them.

Lesson 1: Bootstrapping Remote Teams Is Hard

1	Applying US model did not work	Invest in potential & new grads
2	Negative association of the “SRE” title	Standardize SRE title
3	Pre conceived notion of US based companies	Evangelize SRE role

Lesson 1: Bootstrapping Remote Teams Is Hard

OUTCOMES



Don’t expect hiring patterns from other markets to necessarily work



Leverage other sources: College Grads, High-Potential junior engineers



Leverage the community to help; you’re likely not alone

Lesson 2: Create Your Own Identity

1

Mirroring teams does not work

Invest based in value addition & local needs

2

Projects

Work patterns are different

& FINDER

& ALERT CORRELATION

Focus on opportunity and strengths

3

Need engaging work to sustain teams

Provide quality work for the teams

Lesson 2: Create Your Own Identity

OUTCOMES



Don’t map teams 1:1 across offices



Use lulls in workload to give them hard problems they can own



Find the right balance, quality vs quantity

Lesson 3: One Size Does Not Fit All

1	Every team is unique	Curate to specific team need
2	Equal ownership is critical to success	Equal partnership in running a product
3	Right leadership is essential	Alignment on leadership commitment & investment

Lesson 3: One Size Does Not Fit All

OUTCOMES



Focus on teams that have shown that they can collaborate



Mistakes will happen; own them and fix them quickly

Bangalore Today



Strong team presence:

- 60+ SREs across 10 teams
- 100+ application developers
- Owns LinkedIn core messaging platform



Building region-specific products:

- Performance focused mobile client
- New college grad placements
- Filling India's blue-collar labor gap



SRE Globally Today



300+ SREs across four global offices

Learnings from BLR led to other regional expansions

Takeaways from our Journey



Thanks!